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THE BARK OF THE ROOT OF MYRICA CERIFERA.

By GEORGE M. HAMBRIGHT.

(An Inaugural Essay.)

The plant which yields the Bayberry bark is also called Wax-Myrtle—Candle-berry Myrtle. Nat. Order Myricaceæ, Sex. Syst. Dioecia Tetrandria. There are four American species of this shrub, viz.: *M. gale*, *M. carolinensis*, *M. pennsylvanica* and *M. cerifera*; the latter forming the subject of my essay, which was suggested as being worthy of consideration.

The bark, however, will receive my attention only; as it seems to be the medicinal part of the plant of this species, and the only one that is noticed by the text-books.

Myrica cerifera.—This shrub, a native of the United States, is found growing along the Atlantic sea coast from Florida to the New England States, and more particularly in the eastern part of New Jersey; attaining a height of from three to twelve feet, much branched, presenting a fine contrast with the barren soil which surrounds it. “Leaf, two to four inches long; one-half to one inch wide; lanceolate, mostly obtuse; entire pubescent underneath, and tapering into a petiole. The flowers, which appear in May or June, before the leaf is fully expanded, are in short axillary aments, dioecious, each in the axil of a scale-like bract, calyx and corolla none; stamens two to ten, with the filaments united below; ovary enclosed in a cup of three to six rounded scales; stigma two, flattened on the inner surface. The fruit or berry is globose, being covered with a down of an ash grey color, having a waxy appearance.”

The berries when boiled in water yield their waxy coat, which, being collected and formed into cakes after purification, constitute the "Myrtle Wax" of commerce.

It is reputed to possess medicinal virtues, but the most general use to which it is applied, is by the residents of the rural districts of New England and New Jersey, who use it, either alone or combined with tallow, for making candles or stiffening the ends of lamp wicks. Hence, it is often called *Bayberry tallow*.

As a remedial agent, it first attracted attention about the year 1822, when it was successfully employed by the late Dr. Wm. M. Fahnestock, in an epidemic of typhoid dysentery; which prevailed at Harrisburg, Penn'a., at that time.

It is not my purpose to dwell on this subject; I shall therefore proceed to investigate the bark of the root.

Physical properties of the bark.—The bark, as found in the shops, is in pieces from one to six inches long, with a grayish mottled appearance, and slight transverse fissures externally, and covered by a paper-like epidermis, which gives it the variegated character as above mentioned. This can be readily separated from the true bark by means of a knife, when the exposed surface is rugged and admits of being highly polished.

The pieces are usually curved or quilled, presenting a dull reddish-brown color externally, after the covering has been removed; internally the color is much darker, approaching more nearly a brownish hue. It breaks with a short fracture, exhibiting at the ends the ligneous fibres, and giving rise to a small amount of dust, which excites sneezing when brought in contact with the lining membrane of the nose.

Its taste is peculiar, at first slightly bitter, then a decided astringent and acrid impression follows, attended with a stinging sensation on the end and along the edges of the tongue, extending to the fauces, where it leaves an unpleasant feeling with a sense of constriction. The dry bark floats in water, until it becomes thoroughly saturated with moisture; when it sinks, imparting an amber color to the infusion.

The powder is of a light brown color, with a pungent and peculiar spicy odor, strongly sternutatory and exciting cough, and possessing the property of frothing when it is agitated with water.

From the violent sneezing produced by the particles of bark which float in the air, and the dense froth occasioned when a small quantity of the powder is stirred briskly with water, I am induced to believe that it contains a principle analogous to, if not identical with, *Saponin*. It yields its virtues to water and diluted alcohol. The latter being the *best* menstruum.

Chemical investigation.—Four hundred and eighty grains of the finely-bruised bark were macerated in water for twelve hours, then displaced until eight ounces of liquid were obtained. This had a fine red color, and possessed the astringent taste and peculiar odor of the bark.

Solutions of tannic acid, sulphate of copper and corrosive chloride of mercury, produced precipitates when added to the above infusion, indicating the presence of *albumen*. Tincture of sesquichloride of iron caused a dense blue-black precipitate of tannate of iron, and solution of gelatin a curdy precipitate, proving the existence of a large amount of *tannic acid*.

The tannin existing in a portion of the infusion was precipitated by gelatin and the liquid filtered. To the filtrate, tincture of sesquichloride of iron was added, when a characteristic dark precipitate was eliminated, which disappeared on the application of heat. This is a proof that *gallic acid* is one of its constituents.

The dregs left from the infusion were boiled in water and filtered while hot. After cooling, tincture of iodine produced with the filtrate a fine blue color, which was destroyed by heat. By which test we recognize the presence of *starch*.

Solution of sub-acetate of lead threw down a curdy precipitate, which is an indication that *gum* enters into its composition.

One thousand grains of the bruised bark were exhausted with alcohol (-835), the resulting tincture was of a deep red color, resembling Port wine. It had a peculiar biting taste, with some astringency.

A portion of this was evaporated on a sand bath, which yielded a dark shining extract which was slightly acted on by water and ether. Another portion was evaporated to a semifluid consistency and spread on glass to dry. This extract when powdered constitutes the "*Myricin*" of the "Eclectics." Another, form

of this resinoid principle is prepared by throwing a concentrated tincture on water, which precipitates the resin.

The only difference between the two products is, that the latter resin is deprived of a little coloring matter together with some of its astringency.

The water into which the tincture was thrown, and from which the resin had been separated, was evaporated and spread in thin layers upon glass. When dry it formed red transparent scales, with little taste and no odor. These are soluble in water, forming a light red solution. *Red coloring matter* also enters into its composition.

One thousand grains of bruised bark, which had previously been macerated in water, were introduced into a distillatory apparatus and the heat gradually applied. The distillate was slightly cloudy, possessing the odor of the bark in a very marked degree, and a perceptible empyreumatic odor was also noticed.

A volatile oil is believed to exist in it, although the foregoing experiment did not satisfactorily verify the truth of the statement, as the amount of bark operated upon was too small to be attended with any definite result.

Six hundred grains of powdered bark were exhausted with ether (.750). The ethereal tincture was of a light straw color, which, by spontaneous evaporation, left a thick viscid extract of a yellow color. It had an acrid nauseous taste, with some resemblance to that of the extract of valerian. Cold water did not affect it; by boiling, it is separated into flocculent masses; it is soluble in hot 95° alcohol which deposits it on cooling. It burns with a brilliant light and not much smoke, giving rise to an aromatic odor. After becoming thoroughly dry, it was readily reduced to powder. During this process it cakes under the pestle, owing to the heat generated during the trituration.

This substance I take to be an *acrid resin combined with wax*, or a modified form of wax as it exists in embryo, in the vessels of the plant, before being deposited on the berry, and thus exposed to the chemical action of sun-light and air.

Five hundred grains of bark were exhausted by a menstruum composed of one part of water and three parts of alcohol. The liquid was evaporated, and water added from time to time, until

all the resin was precipitated. This was removed, and the remaining liquid evaporated to a thin syrupy consistence and set aside.

A deposit soon formed, which was collected, washed with alcohol and dried, yielding a mass of crystalline plates of a dirty white color.

The bark which was exhausted as above, was then treated with hot water, which gave a small quantity of *extractive matter*.

Investigation of the aqueous extract.—The aqueous extract prepared by careful evaporation at a temperature of 80° Fahr., was entirely soluble in cold water, forming a slightly cloudy solution. Not acted on by ether or chloroform, slightly soluble in cold, and about one-half taken up by boiling alcohol. It had not much odor, but a strongly astringent taste, with very little acridity. A portion of this extract was treated with boiling absolute alcohol, which dissolved about one-third. This was digested with animal charcoal, filtered through the same substance and evaporated, which left a resinous extract having an astringent taste, and which produces precipitates (black) with the sesqui-salts of iron.

Investigation of the alcoholic extract.—This extract, while warm and of the consistence of molasses, presents a dark, shining, uniform appearance; on allowing it to stand for twenty-four hours, a deposit of a yellow color took place throughout the mass, and which remains diffused as the mass hardens.

Sixty grains of this extract were treated with ether, which dissolved one-third; which solution, after evaporation, left a resin having a granulated appearance, similar to fused wax when it is thrown into cold water. This, on examination, proved to be identical with the resinoid substance obtained by percolation with ether as described above. That part of the extract not acted on by ether was redissolved in alcohol and evaporated. The result was a red, brittle resin, translucent, with a purely astringent taste. The inference which we draw from these experiments is, that the bark contains *two resins, both soluble in alcohol and one in ether only.*

The bark which was acted on by ether was then treated with absolute alcohol until it was exhausted. This tincture was evapo-

rated, at a temperature of 85°, to one-eighth of its original bulk and allowed to stand.

At the end of twelve hours a slight deposit was observed on the bottom of the capsule, presenting to the naked eye a mass of granules. This continued to increase until twenty-four hours after I first made the observation, when it assumed a crystalline form, in plates or flat prism-like masses arranged on strings, having some resemblance to rock candy.

The supernatant liquid was decanted, the deposit treated with a small quantity of alcohol and put into a test tube. It soon precipitated to the bottom, when the alcohol was decanted and the powder collected. This substance seems to be identical with that obtained by the process mentioned on page 197. When first collected it had a hydrated appearance, which was somewhat reduced by desiccation.

When dry, it separated from the capsule in masses or granular groups. It had not much taste at first, but it soon renders its presence evident by the persistent action exerted on the fauces as it is gradually dissolved by the saliva, and which is rendered still more evident when water is taken into the mouth. It is sternutatory, soluble in water, forming an opalescent solution. The smallest quantity produces a thick froth when it is agitated with water, which remains permanent for some time. It had not all disappeared at the end of thirty-six hours. An excess of cold alcohol does not form a perfect solution. Hydrated ether and chloroform possess little or no action on it.

Exposed to heat, it swells and blackens, but does not volatilize. In the air it is inflammable, giving off smoke and an aromatic odor resembling that of burnt coffee. Muriatic acid turns it yellow. It is decomposed by strong sulphuric acid. Nitric acid dissolves it, forming a slightly turbid solution; on the application of heat the liquid is slightly coagulated, after which an energetic reaction takes place, evolving disagreeable gaseous fumes, which continues after the flame of the lamp has been withdrawn. The result is a perfect transparent solution. A new compound seems to be generated by this reaction, the nature of which I have not determined.

With reagents it gives the following results, viz. :—Nitrate of Silver, a light red color; Nitrate of Baryta, no change; Oxal-

ate of Ammonia, a slight cloudiness; Bichloride of Mercury, no change; Subacetate of Lead, a light yellow precipitate; Bichloride of Tin, a golden-yellow precipitate; Bichloride of Gold, a deep purple color.

It has an acid reaction on litmus, and alkalies and their carbonates produce deep yellow solutions. With aqua ammonia it causes a curious reaction. A small portion was agitated with water; to the turbid solution thus formed ammonia was added, which immediately produced a deep green, transparent solution; this quickly changes to red, and finally yellow.

By throwing this chameleon-like solution (if such I may call it) into water, it first gets green, next red, and lastly yellow. The play of colors in the latter instance succeed each other with much more rapidity than in the former.

When in solution or suspended in water, it unites very readily with ammonia and potassa.

The ammoniacal solution by evaporation produces needle-shaped masses of a black color, and the potassa solution crystalline plates of an orange-yellow color, both losing the power of frothing when agitated with water.

The above lengthy experiments with this peculiar substance were made with a view of deciding whether this bark contained a substance analogous to *Saponin*, as was suspected and noted in the beginning of my remarks, and which I conclude is here isolated. But, on comparing my notes with those of Messrs. Bucholz and Bussy "On Saponin," in the 19th vol. *Journ. de Pharmacie*, I find that the above results agree in but few of the experiments, and I therefore conclude, that the crystalline principle is one peculiar to the bayberry bark, and, for want of a better name, will call it *Myricinic Acid*, to distinguish it from *Myricin*, one of the constituents of the wax obtained from this plant.

A few grains of *Myricinic Acid* were redissolved in boiling alcohol and filtered, and the filtrate put into a watch glass, and permitted to evaporate. After standing a few hours the crystals were deposited in globular masses of a white color; on looking at the substance again, I found the summits of the granules were tinted with yellow, caused no doubt by the vapor of ammonia coming in contact before they were perfectly dry, and

to the action of which alkali it is extremely susceptible, and which serves to detect it in the most minute quantities by the yellow color which is produced. One of the grains, on being placed under the microscope, appeared to be composed of numerous acicular crystals, arranged around a common centre, which, on being broken, gave microscopic crystals like sulphate of morphia

Inorganic constituents.—One thousand grains of bark yielded, after incineration in a crucible, one hundred and twenty-five grains of a light-colored ash, which effervesced with acids. A solution was made from a portion of the ashes with hot water, which had an alkaline taste; tartaric acid added to the solution caused a precipitate of *bitartrate of potassa*; carbonic acid gas a white precipitate; and oxalate of ammonia, an insoluble precipitate of *oxalate of lime*.

Sixty grains of the ash were treated with water and filtered. No indications of the presence of iron were given in this solution. Chlorine gas was then passed through another portion of the solution. The chlorine was driven off by heat, when the addition of ferrocyanide of potassium caused a deep blue precipitate. By this process we infer that *iron exists as a protoxide*.

One hundred grains of the ash were digested in dilute muriatic acid, the solution filtered, and the lime precipitated by an excess of carbonate of ammonia, which was removed by filtration and the filtrate boiled. After cooling, a solution of phosphate of soda, threw down a precipitate of *phosphate of magnesia*.

That portion of the ash not affected by muriatic acid was boiled with liquor potassæ and filtered. The solution was diluted with water and muriatic acid added to saturation, when a precipitate of *hydrated silicic acid* was produced.

Lastly, the ash left untouched by the acid and potassa was fused with potassa, which formed a compound readily soluble in water. This I take to be *silicious sand*.

From the foregoing analysis we may conclude that the bark of Bayberry Root contains the following organic and inorganic constituents:

Organic constituents.—Albumen, tannic acid, gallic acid,

starch, gum, red coloring matter, extractive matter, volatile oil, (traces,) an acrid resin soluble in alcohol and ether, an astringent resin soluble in alcohol, insoluble in ether; myricinic acid (a peculiar principle possessing properties analogous to saponin), ligneous fibre.

Inorganic Constituents.—Salts of potassa, salts of lime, protoxide of iron, magnesia, silicic acid.

Medicinal properties and uses.—This drug, which is used by the "Eclectics," is reputed to possess tonic and stimulant properties, combined with a considerable amount of astringency, which latter quality renders it eminently valuable in the treatment of diarrhoea and dysentery. Its peculiar acrid property also renders it useful in catarrhal complaints, then acting as a very efficient errhine.

It is placed in the officinal list of remedies of the Thomsonian's, by whom it is used as a specific for jaundice. It also constitutes one of the chief ingredients in their so called "*Composition Powder.*" The powdered bark, when given in large doses, is actively emetic, caused by its irritating action on the mucous membrane of the stomach.

In fact, it has been asserted to possess emetic properties equal to ipecacuanha; the truth of this or any of the above statements in regard to its therapeutical virtues I cannot substantiate by actual experiment, as circumstances would not permit me that pleasure.

As far as I am informed, this article under consideration has not even received a passing notice from the recognized School of Physicians (Allopathic,) but is slighted for the reason which is given by our honored Professor of *Materia Medica*, when speaking of drugs of a similar nature, "that American practitioners, instead of employing our indigenous plants, prefer using those from a foreign country, which are not so good but much more expensive."

The dose of the extract is stated to be from five to ten grains; of the powder, twenty to thirty grains; and of the myricin, (or resinoid matter,) from two to five grains.

Its properties must, therefore, reside in the two resins, acrid and astringent, and perhaps in the substance called *myricinic acid*, as the future may determine.

Feeling fully confident that the bark contains virtues of no mean value, as a remedial agent, and trusting that its actual therapeutical properties will be determined by the medical profession, I shall reserve this as the basis for a future paper, when I hope I will be able to institute a more thorough investigation.

Philadelphia, January, 1863.

FORMULA FOR AN AQUEOUS SOLUTION OF BROMINE TO BE USED FOR MEDICINAL PURPOSES; AND SUGGESTIONS FOR THE THERAPEUTICAL USE OF CHLORIDE OF BROMINE.

BY J. LAWRENCE SMITH, M. D.

Of the Louisville Chemical Works.

The increased demand for bromine from the Louisville Chemical Works, where it is kept for the purpose of making the different compounds of this substance, induced me to inquire for what purpose it was used, and I learned that it is being employed largely as a therapeutical agent, either in the form of vapor mixed with air or as an antiseptic in purifying the atmosphere of hospitals where erysipelas, gangrene, scarlatina, small pox, &c., exist; also, locally in some of these diseases, and internally in diphtheria, &c. Knowing full well the inconvenience of the use of this substance in the form called for, I at once undertook to compound a solution that would meet the ends required, and be more convenient for any therapeutical use to which uncombined bromine might be applied.

From the slight solubility of bromine in water, any attempt to dissolve it in this liquid would give too dilute and bulky a solution; the natural suggestion, therefore, was to use but little water, and facilitate its solubility by the addition of bromide of potassium. The first formula used was 1 troy ounce of bromine, 120 grs. bromide potas. and 1 fluidounce distilled water. This formula left a small quantity of bromine undissolved, and the solution was too concentrated. After varying in the proportion, the following is considered the most convenient formula:—

Take of Bromine, 1 troy ounce.

Bromide of potassium, . . . 160 grains.

Distilled water, q. s.

To make four fluidounces of the whole mixture. Dissolve the bromide of potassium in about two fluidounces of water, add the bromine, agitate, and finally add enough water to bring the whole to four fluidounces, then mix thoroughly, and keep in well stoppered bottles; if much of the solution is made, it is better to divide it into small packages of two to four ounces, than to keep it in one large bottle to dispense from, for the vapor escapes so readily from the solution, that if there be much space in the bottle bromine will be lost. This makes a dark red solution, evolving strong fumes of bromine, and readily soluble in any additional quantity of water. I have given this formula as one that will doubtless recommend itself to those of the medical profession engaged in using bromine. Its effects when applied locally in hospital gangrene are said to be very remarkable.

Notwithstanding the above solution seems to be all that can be desired where bromine is to be used, I would recommend to the medical profession the use of a compound of bromine that must have energetic effects in the same direction as the pure bromine, namely, the *chloride of bromine*. This is soluble in water, and a solution of it might be kept and employed in the same way as the solution of bromine. I shall shortly have some of the chloride of bromine made and experimented with.

NEW FORM OF DRY PERSULPHATE OF IRON.

By J. LAWRENCE SMITH, M. D.

Of the Louisville Chemical Works.

The use of the persulphate of iron has been very much extended in the last few years, and various formulæ have been proposed for making it, all of which are very good. But it is not in forming the solution that there is any thing needed, but it is the transformation of it into a solid that most is desired. Some have dried it on plates in a hot-chamber, and others have dried it by the direct application of heat, giving it a porous structure not unlike tannic acid when first dried. I have given to it these forms successively, but they all have objections. Heated on plates, if the temperature be too light, or continued too

great a length of time, a portion becomes insoluble, other forms are deliquescent, and soon become moist in contact with the air. Having succeeded in drying it into an almost impalpable powder unalterable in contact with air, and very soluble in water, I propose describing, as near as possible, the method by which this is arrived at. As regards the solution of persulphate I am not very particular about the formula, preferring, however, one proposed for Monsel's persulphate

Sulphate iron,	100 troy ounces.
Distilled water,	2 gallons.
Sulphuric acid,	5 troy ounces.
Nitric acid,	5 troy oz. or q. s.

for peroxidizing the iron, when the whole is brought to the boiling temperature. The manner of doing this is familiar to all operators. The solution is allowed to cool somewhat, then filtered and concentrated to a density of 1.60. It is now allowed to cool, and poured into shallow plates to the depth of one-sixteenth or one-fourth of an inch, and a little of the dry powder obtained from a previous desiccation is scattered on the surface of the liquid in each plate. The plates are then placed on shelves in a part of the laboratory where a little steam is escaping, and the temperature is from 75° to 100° Fah., according to the season.

In my works, shelves are constructed 2 or 3 feet above a series of steam jackets in which live steam is used, and always more or less escaping from the sides of the jackets. In from 24 to 48 hours the contents of each plate begin to rise in cauliflower excrescences, that after a little longer exposure become dry, and rub down between the fingers to an impalpable powder; and when rubbed down and passed through a tolerably fine iron sieve, has very much the appearance of mustard. It can be exposed to the air without its absorbing moisture or undergoing any alteration. When thrown into water, the water becomes turbid, but in a few moments clears up, affording a red solution. It is soluble in a very small quantity of water. When it is desired to use it in the solid form as a styptic, it can be taken in the fingers and scattered on the wound or other surface as any other powder may be applied. This manner of drying a substance considered deliquescent, doubtless appears a very singular

one, and it certainly was not suggested by any train of reasoning, but discovered altogether by accident, and I have tried to bring about the result by other arrangements, but the solution placed on shelves in the same room not more than ten feet off, but not exactly under the same condition of vapor and temperature, acts entirely differently ; the solution, instead of drying, becomes more dilute from absorption of moisture. In the drying room proper, it solidifies into a hard mass. Accompanying this note I send a specimen of the persulphate.

OXYCOCCUS MACROCARPUS, (CRANBERRY.)

BY GEORGE W. ELDRIDGE.

(Extracted from an Inaugural Essay.)

Artificial System : Octandria Monogynia.

Natural Order : Ericaceæ.

This is a small prostrate shrub, with threadlike runners, from one to six feet in length supporting vertical branches, on which are borne the lengthened axillary pedicels bearing the corolla. The corolla has sublinear reflexed segments with lanceolated points, and is succeeded by the fruit, a berry of a light scarlet color when not exposed directly to the sun, but one side dark brown when growing on the upper branches. The leaves are alternate, slightly revolute, and supported on very short petioles, their color conforming as near as possible to that part of the plant on which they are placed ; the oldest being of a dark brown color, having passed in their growth through many intermediate shades of color, from a purple in the recent shoots to a greenish hue, light at first, and then darkening as they become older. The roots in their native meadows are similar to the branches in many respects ; and in fact seem to be but subterranean stems.

The wild cranberry, inhabiting the open boggy meadows of the coast, from Maine to North Carolina, and those also of Wisconsin and Michigan, is an exceedingly hardy little plant, and prolific bearer, when in a favorable situation : being so in almost all soils, if not overpowered by other plants. The soil best adapted to its growth appears to be a loose composition of decay-

ing vegetable matter, with silica and an abundance of water. This modest little plant has not attracted the attention of agriculturists, until within a few years. The inhabitants of Cape Cod appear to have first realized the advantages of cultivation upon both the quantity and quality of its fruit. Their success induced others to attempt the cultivation of this plant, so that now it is a staple article of produce in some districts of our country. The amount annually cultivated and brought to Philadelphia from New Jersey amounts to several thousand bushels, and is still on the increase. The mode of cultivation found to be most successful in New Jersey is first to reclaim a meadow or swamp through which passes a small stream of water, which element seems most essential to its growth. The land thus reclaimed is cleansed as thoroughly as possible from all roots and rubbish. The soil is then broken up by the plough and harrow, and furrows are made four feet apart. The plants are then arranged one foot apart in the furrows; the roots being covered with a sufficient quantity of earth. Thus placed, the runners will, with careful culture, nearly cover the ground the third year, and the fourth year a crop may be expected, meanwhile the overseer prepares dams and gates, and through the winter and at other times when necessary overflows the plants with water as a protection from frosts and insects. They flower in June, and the fruit ripens in October, at which time they should be gathered as soon as possible to avoid frosts. The fruit is solid and durable when gathered in good condition at the proper season.

This subject being suggested to me by a graduate of this College, now extensively cultivating the fruit in the State of New Jersey, I concluded to make an investigation of the fruit for the purpose of ascertaining what acid exists in the berry and in what quantity.

Four ounces of the berries were bruised and expressed through strong linen. The dregs were then transferred to a glass funnel, using water as the menstruum until exhausted. The resulting liquid was then added to the pure juice, which measured four fluid ounces; one part of strong alcohol was then added to four of the diluted juice, and heated to the boiling point to coagulate the pectin and albuminous substances, which were separated by

filtration. The alcoholic liquid or juice was then evaporated by means of a water bath until all the alcohol disappeared. It was then diluted with a small portion of water and passed through pure animal charcoal until the coloring matter was entirely removed. The liquid has then the appearance of pure water, but is quite acid. To a portion of the acid liquid, basic acetate of lead was added which threw down a dense white precipitate entirely soluble in nitric acid and citrate of ammonia.

A solution of carbonate of potassa in excess was added, but caused no change. Tartaric acid produced no change, cold or hot. Lime water no precipitate in the cold or by boiling. Chloride of calcium produced no precipitate, even on boiling. Boiled with sulphate of copper and liquor potassæ suboxide of copper was thrown down by the grape-sugar present. The combined tests satisfactorily prove the acid present in the berry to be citric acid, without the presence of any oxalic acid. And experiments were now made to ascertain the percentage in which it existed in the fruit.

The remainder of the diluted juice was then evaporated on a water-bath to the consistence of a thin syrup, having a very sharp acid taste. This was set aside for four weeks for the purpose of ascertaining whether the crystals could be obtained by this process, but without success. The syrupy liquid was again tested for citric acid, to ascertain whether any change had taken place during this time, but I was unable to detect any change whatever in the acid, except that it had become quite thick by spontaneous evaporation, and by the presence of a large amount of gum found existing in the juice. To this syrupy and acid liquid a portion of hot water was then added, and to this fresh slacked lime in fine powder was gradually added so as not to be in excess. It was then boiled, forming an insoluble citrate of lime. This was thoroughly washed and dried on paper. The insoluble salt of lime was then decomposed by officinal diluted sulphuric acid. The resulting insoluble sulphate of lime was then separated by filtration, and the filtrate of lime evaporated on a water bath until a pellicle began to form. It was then set aside for two weeks in a moderately warm place, free from much draught; at the end of this time large crystals were formed quadrangular in shape, having dihedral summits.

These crystals were analyzed and proved to be crystals of sulphate of magnesia, by which I infer that the lime used contained magnesia.

Six ounces more of the fruit was bruised and expressed as above, and the resulting liquid was set aside in a moderately warm place for three days; at this time the juice had commenced to undergo a fermentation, during which the mucilaginous substance separated, and from which the pure juice was poured off and filtered. The resulting juice measured two fluid ounces; three and a half fluid drachms of this juice were exactly saturated by half a scruple of bicarbonate of potassa, this result shows that the juice of the cranberry contains about one-half as much citric acid as the juice of the lemon; as it requires one scruple of bicarbonate of potassa to saturate the same quantity of lemon juice.

Cranberries vary very much in their yield of juice, owing to the time they are gathered, and the condition in which they are kept. When the fruit is fresh and entirely ripe, they will yield from one-half to two-thirds of their weight of juice.

Estimating from results, the cranberry juice contains 3.174 per cent. of citric acid, a large amount of gum, pectin, coloring matter, and a small amount of grape-sugar.

An experiment was next made with the cranberry seeds. 81 grains of the seeds were first experimented upon, these were dried and finely powdered, then firmly placed in a glass test tube with sufficient opening at the lower end for the liquid to pass out, 95 per cent. alcohol was used as the menstruum, taking out all the coloring and extractive matter, which was of a blood-red color, having a peculiar sweetish taste.

This liquid reacted as follows:

Liquor ammonia instantly changed it to a green, basic acetate of lead gave a copious green precipitate to the liquid in a very diluted form; nitrate of silver changed it to a brown.

The powdered seeds which had previously been treated with alcohol, were then treated with hydrated ether, by which a fixed oil was obtained, having a bland sweetish taste. This oil is of a beautiful greenish yellow color, much resembling that of olive oil, in appearance. Its specific gravity is .97, insoluble in alco-

hol, cold or hot, soluble in its own weight of ether, solidified by the mineral acids.

The skins were next experimented upon, half an ounce, previously dried, were finely powdered, moistened with strong alcohol, placed in a percolator, and exhausted with strong alcohol (95 per cent). Six fluid ounces were sufficient to entirely exhaust the skins. This liquid was of a deep red color, slightly acid. To this, water was added, which immediately threw down a copious dirty, yellow precipitate; this was collected on filtering paper, washed with boiling water, dried on bibulous paper, and pulverized; its weight was ten grains. This substance is soluble in chloroform, soluble in oil of turpentine, readily soluble in fixed oils, soluble in strong alcohol at 175° Fah.—fuses at 130° Fah., and combines with the caustic alkalies to form soap. From the results of these experiments I infer the substance obtained to be wax.

The mother liquor was treated with boiling water, which again caused a precipitate; this, when collected, washed and dried, as above mentioned, was of a greenish color, fusing at 120° Fah., soluble in boiling alcohol, soluble in chloroform, but nearly insoluble in the fixed oils, after fusion, and saponifiable by the caustic alkalies. I infer by these experiments that this substance is also a wax, but differing somewhat in its qualities from that first obtained.

The mother liquor, which had been previously treated to separate the wax, was treated with subacetate of lead, which threw down a copious precipitate.

From the results of these experiments I conclude the cranberry (as a whole) contains citric acid, gum, a fixed oil, extractive matter, vegetable albumen, coloring matter, grape-sugar, and wax.

ON MEDICINAL COMPOUNDS OF IRON WITH ALBUMEN.

By EDWIN R. SMITH, of Monmouth, Ill.

The services of the potent and beautiful science of chemistry to the science of medicine are inestimable. Its rapid progress has caused opinions to explode, errors to perish, and discoveries

of truth to enlarge the limits of knowledge, until *now* man looks through surrounding phenomena out into the infinite of truth. He reads the laws of organized life, unravels a mystery in every plant and mineral, finds a remedial agent in almost everything.

Among the numerous remedial agents added by chemical science to *Materia Medica*, there are few, if any, possessed of more worth and interest than the preparations of the useful metal *iron*. Physiological chemistry having shown this element *iron* to be an essential in the composition of the human system, skilful chemists have endeavored to prepare ferruginous preparations adapted to supply its deficiency to the organism occasioned by disease. And they have met with the happiest results; for the chalybeates are among the most numerous and valuable of all the medicines. Yet, satisfactory as this class of preparations is, additions are constantly being made to it. The most recent one proposed is by the writer *Angelico Fabri*, namely, "Albuminate of Iron and Soda." Our attention being attracted by this somewhat novel therapeutic agent, I made a series of varied experiments, with a view of ascertaining its character, the nature of the writer's formula, and producing, if possible, an improved formula. The results of our investigations were to find the process given for "Albuminate of Iron and Soda" faulty, and to produce formulæ for albuminate of iron and soda, albuminate of iron and potassæ, and albuminate of iron, soda and potassa, all of which I briefly note in the present essay.

The formula given by the writer referred to for "Albuminate of Iron and Soda," is as follows:—

" Take of Sulphate of Iron, grs. 104	
Caustic Soda, " 112	
Whites of Egg, 4	
Lime Water,	
Carbonic Acid, each q. s.	

Dissolve the sulphate of iron and caustic soda separately in a sufficient quantity of water, and pour upon whites of eggs previously beaten up; shake together, and pour upon a filter to separate hydrated oxide of iron, which will be precipitated. To the filtered solution add lime water, to decompose sulphate of soda

formed by the decomposition of sulphate of iron by the soda present in excess, by which an insoluble sulphate of lime is precipitated, which latter is separated by a second filtration. Subject the filtered solution to a stream of carbonic acid, to form an insoluble carbonate of lime, with lime present, and again filter. Finally, evaporate the mixture in a wide shallow vessel until reduced to a pint." Now, while the process given is a legitimate one, I find by experiment that it has objections, which are briefly as follows: to wit, (1). Difficulty of separating in the first filtration the precipitated hydrated oxide of iron, because of its gelatinous character. (2). Liability of using an excess of carbonic acid rendering the insoluble carbonate of lime formed soluble. (3). Tendency of the sulphur in white of egg to become sensible, by the gradual oxidation of the iron, it combining with albumen as peroxide. (4). Great length of the process, consequent on variety of manipulation. (5). The resulting compound is not permanent.

Now, I endeavoured, by a variety of interesting experiments, to effect the combination of iron with albumen, in such a manner as to be free from the objections mentioned. And I now, give as the final result of my experiments the following formulæ, founded on converting iron into sesquioxide, albumen playing the part of an acid, and uniting with it only as such:—

Albuminate of Iron and Soda.

Take of Sol. Tersulphate of Iron, 1 fluidounce.

Pure Caustic Soda, 75 grains.

Whites of Egg, 3

Water, 4 fluidounces

Syrup q. s. to make 12 "

Thoroughly mix the whites of eggs with half of the water—2 fluidounces—and add to the mixture the solution of tersulphate of iron. Then add the caustic soda previously dissolved in the remaining portion of the water—2 fluidounces—with constant stirring, which will gradually dissolve the precipitate formed by the ferruginous solution. Finally, pour on a muslin filter, and add syrup to the filtered solution till the measure of twelve fluidounces is attained, and mix them.

Albuminate of Iron and Potassa.

Take of Sol. Tersulphate of Iron, 1 fluidounce.

Alcoholic Potassa, 72 grains.

Whites of Egg, 3

Water, 4 fluidounces.

Syrup, q. s. to make 12 "

Prepare by the same process as that given for albuminate of iron and soda, substituting the alcoholic potassa in the place of the caustic soda.

Albuminate of Iron, Soda and Potassa.

Take of Sol. Tersulphate of Iron, 1 fluidounce.

Pure Caustic Soda,

Alcoholic Potassa, each 36 grains.

Whites of Egg, 3 "

Water, 4 fluidounces.

Syrup, q. s. to make 12 "

Prepare by the same process as that given for albuminate of iron and soda, substituting for the caustic soda the two alkalies, soda and potassa.

Properties.—In each case the result is a syrupy, saline chalybeate solution, containing about five grains of the albuminate, with an excess of albumen, and the alkali soda or potassa, or both as the case may be. It will also be readily seen by reference to the formulæ, that the "Albuminate of Iron and Soda" will contain a small proportion of sulphate of soda, the "albuminate of iron and potassa," a small proportion of sulphate of potassa, and the "albuminate of iron soda and potassa," a small proportion of both sulphate of soda and potassa. The first preparation is of a beautiful orange-yellow, and the other two of a bright Maderia wine color; and the chemical combination of each compound, such that no reaction is produced on them by one of the most delicate tests for the persalts of iron, namely, the ferrocyanide of potassium, unless an acid be previously added to the soluble albuminate.

Merits.—Lecanu, Quevenne, Mitscherlich and others, have shown by chemical analysis, and a vast number of experiments, that the blood contains among other things, albumen, potassa

and iron ; that the latter exists in the form of the sesquioxide of the metal, and that its presence is not demonstrated by the ferrocyanuret of iron, until the addition of an acid to the blood has been made. Besides, that the probabilities are that the mode in which iron enters the system is by albumen uniting with its salts in the stomach, forming compounds which are dissolved by the gastric acids, and thus the chalybeates taken into the stomach enter the circulation. Hence, merits, as therapeutic agents, are presumed to belong to the ferruginous preparations herein alluded to ; for in them, as in the blood, we find albumen, alkali in excess, and iron, forming a chemical compound so powerful as not to be destroyed by the most delicate reagent.

I regret that limited time and acquaintance has prevented me from ascertaining whether practice would corroborate the theory advanced. I am only able to say that the effects of a number of ordinary medicinal doses of these preparations, upon my own system, were such as to induce me to believe them exceedingly nutritive and readily assimilated. This fact indicates, in a measure, that in the combination of iron with albumen, insolubility, the great difficulty with a majority of the ferruginous compounds, is overcome, and solubility, the essential to their activity, attained.

These preparations have the further advantage of not blackening the teeth or tongue, being devoid of inky flavor, and having little, if any, astringency.

The processes adopted in preparing the solution of tersulphate of iron, pure caustic soda and alcoholic potassa, I have omitted, they being those of standard authors.

HISTORY OF THE ORGANIC RADICALS.

By M. AUGUSTE CAHOURS.

A Lecture delivered before the Chemical Society of Paris, March 30th, 1861.

Translated from the French, by W. S. W. RUSCHENBERGER, M. D., U. S. N.

(Continued from page 109.)

We obtain in this way the chloride and bromide of stannethyl,



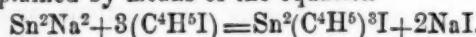
compounds which crystallize in magnificent colorless prisms, isomorphous with the iodide.

The oil with the odor of mustard, which is formed in quantities scarcely appreciable when we make use of pure tin, may be obtained in considerable proportions, if we substitute alloys containing from 8 to 12 per cent. of sodium, taking care to interpose besides an excess of iodoxydric ether. When the alloy contains but from 4 to 5 per cent. of the alkaline metal, there is formed simultaneously the solid and crystallizable iodide, as well as the strongly smelling liquid compound. With alloys of from 10 to 12 per cent. the latter is formed almost exclusively.

The formation of this product, to which analysis assigns the formula



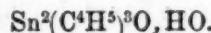
may be explained by means of the equation



This liquid compound, abandoning its iodine to the salts of silver to form crystallizable and perfectly definite products, may be, as well as the solid iodide, considered as the iodide of a new radical which we shall designate under the name of *sesquistanethyl*.

A dilute solution of potassa or of soda, occasions no precipitate in the solution of this product; introduced into a distillatory vessel with a concentrated ley of potassa, or better, with fragments of hydrated potassa slightly moistened, and the mixture warmed, we immediately see condensed in the recipient with aqueous vapor a heavy oily matter, which, on cooling, concretes into a colorless mass formed of inter-crossed prisms.

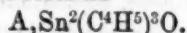
This substance, which crystallizes readily, and whose pungent odor recalls, although in a less degree, that of the oily iodide, is nothing but the hydrate of an oxide corresponding to this iodide, the composition of which may be expressed perhaps by the formula



Distilled upon anhydrous barytes, it abandons its equivalent of water to yield a limpid volatile oil, which is the anhydrous oxide. If water is added drop by drop to this oil, the mixture heats and immediately concretes, producing the crystallized hydrate.

This oxide, which turns the syrup of violets green, and restores

to blue red tournesol paper, after the manner of alkalies, saturates the strongest acids, and forms salts, for the most part soluble, which readily crystallize, and furnish specimens of great beauty. These salts, which are generally volatile, and, when heated, yield an odor analogous to that of the free base, are represented by the general formula

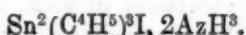


The hydracids behave towards the oxide in the same manner as towards oxygen bases, giving rise to water and to compounds which differ from this oxide only in the substitution of the radical of the hydracid for oxygen,



The chloride and bromide are liquids like the iodide, and are concreted by a slight reduction of temperature, and yield a still more insupportable odor.

The oily iodide unites directly with ammonia, and forms a combination perfectly definite, which can be obtained in the form of magnificent prisms, by introducing into a tube, and hermetically sealing it, a mixture of the liquid iodide and ammonia dissolved in alcohol. The tube, heated in a water bath, deposits on cooling long prisms, the composition of which is represented by the formula



If we cause the iodide of ethyl to act on alloys of tin and sodium, strongly charged with the alkaline metal, and are careful to use the alloy in excess, a very brisk reaction is manifested, and, in this case, instead of having combinations of the metal with ethyl and iodine, we obtain only ethylurets.

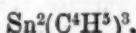
In the reciprocal action of these bodies, we obtain three distinct compounds, namely :

1st. A thick liquid decomposable by heat



which is *stannethyl*;

2d. A very mobile volatile liquid, boiling between 240° and 250° [C.],

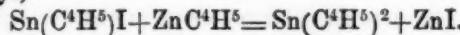


which I name *sesquistannethyl*;

3d. A very mobile, very volatile liquid, boiling between 175° and 180° , which is formed only in very small quantity,



is the *distannethyl*, which Messrs. Buckton and Frankland each obtained from the reciprocal action of zinc, ethyl and iodide of stannethyl,



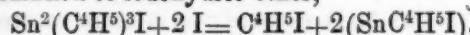
If we cause the iodide to act on the viscid liquid, we produce crystallized iodide; the action of the same body upon the sesquistannethyl cold, gives rise immediately to the formation of the oily iodide with the mustard odor; distannethyl cold produces nothing by contact with iodine. Warmed, on the contrary, a brisk reaction is manifested, and is immediately perceived by the discoloration of the liquid, the iodine being substituted in equivalent proportions, and in proportion to the quantity of iodine and to the duration of the contact, we may obtain at pleasure either the oily iodide, the crystallized iodide, or the iodide of tin.

While stannethyl and sesquistannethyl are susceptible of union directly with oxygen, chlorine and iodine, to form compounds which enter into the group

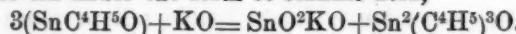


and to be eliminated from their combinations under the influence of preponderating affinities, simulate the properties of simple bodies and behave like true radicals, the distannethyl, which represents the limit of saturation, is entirely incapable of forming compounds, and can only exchange a portion of its elements to assimilate others in equivalent proportion, always preserving the integrity of its group.

We may readily pass back from the series of sesquistannethyl that of stannethyl, and reciprocally by aid of reactions which are easiest of execution. Thus by the action of iodine upon the iodide of sesquistannethyl we produce the iodide of stannethyl, with the formation of iodoxydric ether,



while by distilling the oxide of stannethyl with caustic potassa, we obtain the oxide of sesquistannethyl, with separation of a part of the tin under the form of stannic acid,



The experiments of which I have just related a succinct summary, very clearly establish, that in the reciprocal action with

iodide of ethyl and of tin, compounds are formed which all belong to the group



It was important to determine the mechanical constitution of these products, and to fix their true equivalent.

Among the compounds of tin which belong to the preceding group we will cite the bichloride

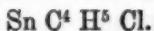


Now, the determination of the density of vapor of this product by M. Dumas, demonstrating that this formula represents two volumes, it will be proper to double it, in order to make it harmonize with the best defined compounds. It will be the same with its analogue



which, according to the experiments of M. Frankland, will likewise correspond to two volumes of vapor.

The chlorides of stannethyl and sesquistannethyl being susceptible of distillation without alteration, like the bichloride of tin, it at once becomes hence interesting to determine the density of these products in their gaseous form. Experiment teaches us that while the formula



corresponds to two volumes, that which represents the chloride of sesquistannethyl



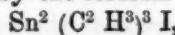
corresponds to four volumes, a constitution which should be very different, although referrible to the same group.

If we replace the iodohydric ether by the iodide of methyl, we obtain a series of products, analogous to those whose history we have just sketched. If we employ pure tin, we have formed, in considerable proportion, a solid iodide, crystallizing in beautiful sulphur-yellow crystals, melting at 30° [C.] into a limpid liquid which boils regularly at a temperature of 228° , and whose composition is represented by the formula



Besides this crystallizable iodide, there is found, though in much smaller proportion, a liquid iodide a little more volatile than the preceding, having an insupportable odor, the composi-

tion of which, analogous to that of the iodide of sesquistannethyl, is represented by the formula



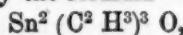
is the iodide of sesquistannethyl.

If we replace the pure tin by an alloy of this metal with sodium, taking care to employ the iodide of methyl in excess, we observe precisely the inverse, as in the case of the ethylic iodide; that is, while we obtain liquid iodide in considerable proportions, we procure but very small quantities of solid iodide.

When the solution of solid iodide is treated by alkaline liquids, there is separated a flocculent white precipitate insoluble in an excess of the reagent, the composition of which, represented by the formula



teaches us that it is the oxide of sesquistannethyl, while the oily iodide, distilled from fragments of caustic potassa, disengages irritating vapors which are condensed in the recipient under the form of a heavy oil, which is not slow in being converted into beautiful prisms. This product, the composition of which is represented by the formula



is simply the hydrated oxide of sesquistannethyl which presents the most perfect isomorphism with the corresponding ethylic compound. Like its homologue, it is separated by distillation on caustic barytes into anhydrous oxide and water.

The oxides of stanmethyl and of sesquistannethyl saturate the most energetic acids, and form compounds which, crystallizing for the most part in a remarkable manner, possess properties analogous to those of ethylic combinations, and are entirely isomorphous with them.

The hydracids behave the same, and form products entirely similar.

The determination of the density of the chlorides of stanmethyl and of sesquistannethyl, under the gaseous form, lead to conclusions, identical to those which the chlorides of stannethyl and of sesquistannethyl furnish. It is thus that

Sn $\text{C}^2 \text{H}^3 \text{Cl}$ represents 2 vol. of vapor,
while $\text{Sn}^2 (\text{C}^2 \text{H}^3)^3 \text{Cl}$ represents 4 vol. of vapor.

Now if we consider that the molecule of all volatile bodies,

whose equivalent can be accurately established by chemical means, always correspond to four volumes of vapor, it will be proper to double all the formulæ of the compounds of stannethyl and of stannomethyl. Consequently we should formulate these different compounds in the following manner :

$\text{Sn}^2 \text{ E}^4 = 4$ vol. vapor. Tetrastannethyl

$\text{Sn}^2 \text{ E}^3 \text{ Cl} =$ Chloride of tristannethyl

$\text{Sn}^2 \text{ E}^2 \text{ Cl}^2 =$ Chloride of distannethyl.

$\text{Sn}^2 \text{ E Cl}^3 =$ "

$\text{Sn}^2 \text{ Cl}^4 =$ Tetrachloride of tin ;

all these different compounds belonging to the same type.

Now the filiation which we here indicate is not purely imaginary, and the behaviour of iodine in respect to the compound

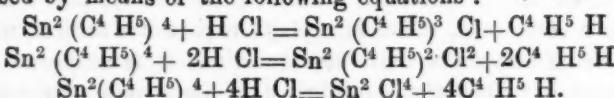
$\text{Sn}^2 \text{ E}^4 = 4$ vol. vap.

demonstrates it in the most evident manner. Indeed, if this product in excess relatively to iodine, avoiding too great elevation of temperature, an equivalent of ethyl is eliminated in the form of iodide, while there appears at the same time this oil, whose insupportable odor recalls that of mustard, and which we have denominated iodide of sesquistannethyl ; if we double the proportion of iodine and favor the reaction by the aid of heat, instead of endeavoring to moderate it by affusions of cold water, there is a separation of a second molecule of ethyl in the state of iodine, and formation of the beautiful crystallized matter to which we have given the name of iodide of stannethyl. If we use an excess of iodine, all the ethyl separates from the state of iodide, and we finally obtain the red iodide of tin. Such is the result which we obtain by warming in close vessels an excess of iodine either with tetrastannethyl, or with the iodides of sesquistannethyl and of stannethyl. From the tetrastannethyl we pass to the corresponding iodide by the simple phenomena of substitution.

The action of acids on tetrastannethyl leads to exactly similar conclusions. If we introduce into a tube a mixture of chlorohydric acid and tetrastannethyl, we observe no reaction, and even after contact of some hours at the ordinary temperature, we may withdraw from the mixture both substances perfectly intact. If these two substances are placed in a hermetically sealed tube and then heated, the tetrastannethyl is modified to an extent propor-

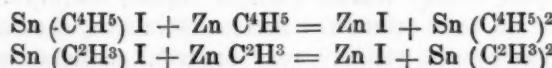
tioned to the duration of the contact. At first we obtain an irritating oil which is the chloride of sesquistannethyl, this gives place afterwards to colorless crystals which analysis proves to be chloride of stannethyl, and by still more prolonged contact we finally obtain chloride of tin.

In these different phases there is developed a gas which is no other than hydruret of ethyl; these very simple reactions, which besides agree perfectly with the preceding, may be expressed by means of the following equations :

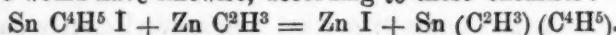


And the manner in which the iodides of sesquistannethyl and of stannethyl behave with the zinc ethyl, seems to me to completely confirm this hypothesis.

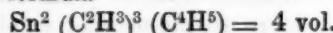
We know from the precise labors of Messrs. Frankland and Buckton that in causing the iodide of stannethyl to act upon zinc ethyl, we obtain iodide of zinc and of distannethyl, and it is precisely this reaction which led them to the discovery of this compound. And so, too, in causing the iodide of stannethyl to act on zinc methyl, we produce distannethyl. Indeed, we have



We would have likewise, according to these chemists :



Now I have satisfied myself that bringing together zinc ethyl and the iodide of sesquistannethyl, there is manifested a vivid reaction accompanied by the formation of an ethereal product perfectly analogous to distannethyl, the composition of which is expressed by the formula



This necessarily indicates the group



as the point of departure of these different products, which we may consider as being derived from it, by partial substitutions or by a complete substitution. The tin hence becomes a simple tetratomic radical.

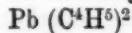
Tin in its contact with the iodides of ethyl and of methyl be-

gets, as we see, a series of products, all possessed of a simple constitution, which are referable to the preceding group. As long as the molecules of methyl or of ethyl which are joined with the tin do not exceed four, that is, as long as saturation is not satisfied, the compounds thus formed may assimilate one or two molecules of oxygen, of chlorine, acting in the manner of *true* radicals. This limit attained, the obtained product possesses, as far as relates to combination, the most absolute neutrality. These results establish, I think, quite clearly, that a body, though a compound, will always play the part of a radical, whenever, being below the limit of saturation, it is endowed with such stability that the equilibrium of its group may not be broken, either by the affinity of simple bodies with which it is put in contact, for the elements which enter into its constitution, or under the influence of forces to which it may be subjected to separate it from combinations of which it forms a part.

The iodides of distannethyl and of tristannethyl, of distanmethyl and of tristanmethyl unite with ammonia after the manner of biniodide of tin, giving rise to compounds very clearly crystallized; those which result from the union of the iodides of tristannethyl and tristanmethyl affect the form of prisms which acquire quite a large volume when we replace the dry alcoholic gas by an alcoholic solution. Aniline, toluidine, cumidine, &c. give similar results, yielding very beautiful products with ammonia.

Lead, like tin, forms with ethyl and methyl clearly defined compounds :

Plumbodiethyl



may be obtained by causing the iodide of ethyl to act upon alloys of lead and sodium, rich in alkaline metal, as M. Lœwig ascertained, or by the reciprocal action of chloride of lead and of zinc ethyl, a much more simple method employed by Messrs. Frankland and Buckton. We do not obtain in this case ethyluret of lead corresponding to the protoxide; there is separation of one-half of the metal and production of a compound which corresponds to the puce-colored [gray] oxide.

The reaction is easily explained by means of the equation.



REMARKS ON THE OLEA COCTA.

By W. T. WENZELL.

For years the query has frequently presented itself to my mind as to the propriety of a variety of pharmaceutical preparations, the so-called Olea Cocta, as chemical analogy has led me to doubt the solubility of malate of hyoscamia in any fixed oil. To bring the subject to the test, and determine the value of these preparations as remedial agents, the following experiments were instituted to show how far my surmises were from being correct: Two ounces of *Foliae hyoscamii* were beat up in a mortar with two ounces of alcohol, then introduced into a bottle, the oil added, and digested with a gentle heat about twelve hours, frequently shaking the bottle. Then the contents of the bottle were transferred to an evaporating dish, and heated at an elevated and carefully regulated temperature, till the spirit was driven off. The oil after filtration was heated with dilute hydrochloric acid, shaking it for some time. It was then passed through a filter previously moistened with water, and the obtained filtrate concentrated by evaporation. On testing the solution with phospho-molybdic acid, solution of iodo-hydrargyrate of potassium, and infusion of galls, no precipitate was obtained. Having thus failed to obtain evidence of the presence of hyoscamia in oleum hyoscamii coctum, the mark left after expressing the oil after filtration, was next made the subject for investigation. This was also digested with dilute hydrochloric acid, filtered and concentrated, when of the several reagents above mentioned, each gave a voluminous and characteristic precipitate. Furthermore, a concentrated alcoholic solution of the leaves was mixed with olive oil, and then heated to expel the alcohol. The oil readily dissolved the chlorophylle and the odorous substance, but there appeared floating along the sides of the dish a white and apparently crystalline substance. The oil was therefore filtered, and the contents of the filter subjected to the action of warm dilute hydrochloric acid. The filtrate gave voluminous precipitates with the above reagents, and on concentrating a part of the solution, then adding bichloride of platinum and a mixture of ether and alcohol, the crystalline double chloride of platinum and hyoscamia instantly subsided. From these ex-

periments it may be inferred, that the preparation the subject of this paper does not possess the medicinal quality which it was supposed to contain, and that, unless some other solvent be employed (perhaps oleic acid,) with better success, the olea cocta must eventually fall into merited neglect and final disuse.

La Crosse, Wisconsin, April, 1863.

GLEANINGS FROM THE FRENCH JOURNALS.

BY THE EDITOR.

Cholesterin in Peas.—M. Bencke has ascertained that this animal principle, usually found in the biliary secretion, exists in young plants, the seeds of many plants and in olive oil. Five pounds of peas furnished about 20 grains of cholesterin. The peas were bruised, extracted with alcohol, the alcohol evaporated, the soft extract treated with water at 100° Fah., and the watery solution boiled with oxide of lead till the solution on standing becomes limpid. The deposit is collected and treated with boiling alcohol, the alcoholic solution treated with sulphuretted hydrogen, when, after standing 24 hours, it deposits cholesterin, which requires to be recrystallized from hot alcohol.—*Jour. de Chim. Méd.*

On the Preparation and use of Crystallized Hyposulphite of Lime.—M. J. Laneau, the Pharmacien in chief of the Hospital of St. John, in a communication to the *Journal de Chimie Médicale*, speaks of the recent suggestions of Dr. Polli, of Milan, and Dr. Jansses, of Brussels, in reference to the use of hyposulphites in diseases due to a morbid ferment. The latter physician has continued the remarkable observations of his Milanese confrére in a pharmaceutical direction, by the aid of M. Laneau, who gives the processes he used.

Hyposulphite of Lime.

Take of Flowers of Sulphur	1000 parts
Quick Lime	400 "
Rain Water	4000 "

Slack the lime with sufficient of the water, add the sulphur and the remainder of the water, and boil the mixture during an

hour and a half, adding water to preserve the measure, then, when cool, filter through white linen on which a double sheet of filtering paper has been spread, and wash the residue with 1000 parts of water, by which a solution of polysulphide of calcium of sp. gr. 1.141 is obtained. Into this a current of washed sulphurous acid gas is passed by means of a suitable apparatus until the solution is decolorized; the excess of sulphur which has been precipitated, when washed and dried, may be used as precipitated sulphur. The clear solution of hyposulphite of lime is now to be carefully evaporated by a heat not exceeding 140° Fah. (otherwise the salt will be decomposed,) until it commences to crystallize, when the solution is set aside. The yield is 700 parts of hyposulphite of lime in hexihedral crystals, which effloresce in dry air.

M. Laneau also prepares hyposulphite of lime from the *sulphite* of lime by digesting at a temperature between 120° and 140° Fah. 150 grammes of sulphite of lime, 40 grammes of washed sulphur and 500 grammes of distilled water during 24 hours, or more, if necessary, and then filter and proceed as before.

Pure hyposulphite of lime may be mixed with powdered sugar and aromatics without change. The mixture retains its dry state even in a humid air, but the author thinks sugar of milk on the whole is a better excipient for the administration of this salt in powder.

M. Laneau has made various pharmaceutical mixtures of the *hyposulphite* of lime and soda with hyposulphite of lime and sugar without any apparent chemical change occurring, and he believes that these salts may be used together if required in tubercular disease. The following formulæ are offered.

Syrup of Hyposulphite of Lime.

Take of Crystallized hyposulphite of lime	10 grammes.
Distilled water	20 "
Syrup of Orange flowers	170 "

Dissolve the salt in the water and mix with the syrup.

This syrup has a cool and agreeable taste; its bitterness is slight and easily masked by aromatics, and it keeps a long time.

Tablet of Hyposulphite of Lime.

Take of Hyposulphite of Lime	10.0	grammes
Gum Tragacanth	1.0	"
White Sugar	188.8	"
Essence of Neroli or mint	10	drops

Mix the powders, make a mass with q. s., water and the essence, and divide into tablets of one gramme each.*

On a chemical process for the decortication of seeds.—M. Lemoine, *Pharmacien*, has made known a very curious process of great practical importance, for the decortication of seeds. Seeds in general, and some leguminous and grass seeds in particular, are decorticated by mechanical means slow and expensive. M. Lemoine having asked himself whether chemistry did not furnish a simple and economical process, has applied the disorganizing action which sulphuric acid exercises on the cortical integuments to this purpose. Taking wheat, for example, he operates thus:—In a wooden tub he puts 200 pounds of wheat, and throws over it 30 pounds of sulphuric acid, 66 Baumé, and stirs the mixture during 15 or 20 minutes; when 100 pounds of water is added, which is uninterruptedly agitated with the grain for some instants and then decanted.

This first washing liquid is reserved for other uses. After sufficient washing, and the neutralization of the last traces of acid by a solution of carbonate of soda or potassa, the wheat is thrown on coarse meshed cloth stretched on a frame, where in less than an hour the seed is sufficiently dry to be taken in the hands without its adhering to it. In this state it is transferred to other frames in well aired positions, where the desiccation is effected spontaneously in several days.

The decortication of rye and oats may be effected in the same manner, but for barley it is necessary to employ an intermediate gentle heat, which effects more promptly the carbonization of the envelopes.

The seeds of Croton tiglium, sunflower, beans, lentils, peas, etc., are also treated with heat, and in less than twenty-five

*ERRATUM.—The word "*hyposulphite*" in italics in line 11th from the bottom of page 224, should read *hypophosphites*.

minutes the testaceous envelope which covers them is completely destroyed, or sufficiently disaggregated to be removed by washing.

Castor oil seeds present some practical difficulties that a longer experience will doubtless dissipate.

Nuts, filberts, bitter and sweet almonds, ground nuts and flax-seed, are treated cold with remarkable facility.—*Jour. de Phar.*

Substances which should neither be heated nor melted in platinum crucibles.—According to Dr. Hager, the following operations cannot be performed :

1st. The fusion of alkaline sulphurets, as well as the reduction by charcoal of sulphates of the alkalies and alkaline earths.

2d. All operations which produce the disengagement of chlorine, bromine, iodine and fluorine ; consequently it cannot be used for aqua regia.

3d. All operations which involve the separation of silicic acid, which at a red heat acts on platinum and renders it brittle.

4th. The fusion or heating of nitrates, especially those of the alkalies and alkaline earths.

5th. The heating to redness of the caustic alkalies and alkaline earths.

6th. The fusion of metals, especially those very fusible, as lead, bismuth, tin and cadmium, and particularly when a red heat is used to reduce metallic oxides.

7th. Heating to whiteness metallic oxides, which give up oxygen at a high temperature, as for example, the oxides of lead, bismuth, nickel, copper, etc.

8th. The heating of phosphoric acid and the acid phosphates with carbon or other deoxidizing agents, because of the tendency to eliminate phosphorus which acts on the platinum :—*Jour. de Pharm.*, Mars, 1863.

Subnitrate of Bismuth as a disinfectant. By M. Reimslagh.—The subnitrate of bismuth, employed in fine powder on the surface, afterwards acts at the same time as a *cicatrizant* and a disinfectant.

It succeeds particularly on suppurating wounds, presenting a weak tendency to cicatrization. A thin layer of the powder (two or three millimetres) is put on the wound, and kept in its place with a piece of wadding or adhesive plaster. The wound

soon assumes a better aspect, and healing is not slow to manifest itself.

M. Riemsagh has also used this agent in the cases of specific and scrofulous ulcers, when the cicatrization was soon complete.

The disinfecting power of subnitrate of bismuth is not less decided. It is sufficient that only one application of this powder be made, to observe the next day the fetid odor of the ulcer completely disappearing.—*Jour. de Pharm. Mars*, 1863.

Oil of Indian Hemp.—M. Grimault recommends the following formula for using this medicine externally:

Take of the Tops of Indian Hemp, finely bruised, two pounds.

Oil of Hemp Seed, four "

Mix them, and digest with the aid of a water bath during five or six hours, until the oil has assumed a deep green color, which indicates that the hemp resin has been dissolved. Then express the oil under a press and filter for use.

The stalks and lower leaves of the hemp should be rejected, as they contain little if any of the active resin, which is secreted in the parts near the organs of reproduction.

The dose of this medicine as an *external* application is a tablespoonful, which is applied over the painful parts in rheumatism, by a gentle anointing, when the part is covered with wadding and this enveloped with gum cloth or oiled silk.—*Jour. de Pharm. Mars*, 1863, from *Bull. de Ther.*

Diuretic Wine.—M. Troussseau has proposed the following new formula for diuretic wine:

Take of Juniper berries, well bruised, 600 grains.

Digitalis, in powder, 120 "

Squill, in powder, 60 "

White wine, a pint.

Macerate during four days, and add

Acetate of Potassa, 180 grains.

Express and filter. The dose of this wine is two or three tablespoonfuls per day. M. Troussseau proposes to call this preparation "Vin diuretique de l'Hotel Dieu de Paris," where he made his chemical experiments.—*Bull. Ther. and Jour. de Pharm.*

PHARMACEUTICAL NOTES.

By WILLIAM C. BAKES.

Ferro Phosphorated Elixir of Calisaya.

A preparation under the above title has been introduced to the notice of the profession, and having met with some favor, various inquiries have been made for a formula. I submit the following as yielding an eligible preparation.

Take of Pyro Phosphate of Iron,	128 grains.
Extract of Calisaya Bark,	24 "
Sugar,	4 ounces.
Water,	2 fluid ounces.
Tinct. Fresh Orange Peel,	1 " ounce.
Sherry Wine,	11 " ounces.

Triturate the three first ingredients in a mortar, add the water, and, when dissolved, the other ingredients; lastly, filter through paper.

Wine of Citrate of Iron and Quinine.

For want of a uniform recipe this preparation often differs with different establishments, and to obviate this difficulty I suggest a formula which yields an article having a pleasant flavor, and each teaspoonful containing three grains of the salt.

Take of Citrate of Iron and Quinine, 6 drachms and 24 grs.

Sugar,	4 ounces.
Water,	1 fluid ounce.
Tinct. Fresh Orange Peel,	2 " ounces.
Sherry Wine,	11 " ounces.

Dissolve the Citrate of Iron and Quinine and the sugar in the water, add the other ingredients and filter through paper.

Suppositories.

After all that has been written concerning these applications, there seems but little room left for further comment, and I design merely to describe a very convenient arrangement for moulding them, which I have used with much satisfaction. It consists of a tin tray with a movable top, perforated with a convenient number of holes; into these are put the suppository moulds, which are made of Britannia ware; the tray is filled with

ice water, and the melted ingredients are poured into the moulds, which, being surrounded with ice water, are soon solidified, and, after an interval of five minutes, may be dropped out by tapping against a hard surface. Suppositories made in this manner are well shaped and present a smooth and even surface. To facilitate the prescribing of suppositories by physicians, some establishments have made a point of numbering them according to their composition. The following list will illustrate this method, and give some idea of the substances capable of being administered in this form.

- No. 1. Butter of Cacao.
- No. 2. One grain of Opium.
- No. 3. Two grains of Opium.
- No. 4. Half a grain of Aqueous Extract of Opium.
- No. 5. One grain of Aqueous Extract of Opium.
- No. 6. One grain of Opium and five grains of Tannin.
- No. 7. Two grains of Opium and two grains of Tannin.
- No. 8. One grain of Opium and five grains of Acetate of Lead.
- No. 9. One grain of Opium and two grains of Extract *Hyoscyamus*.
- No. 10. One grain of Opium and one grain of Ipecacuanha.
- No. 11. Two grains of Opium and two grains of Ipecacuanha.
- No. 12. One grain of Opium and half a grain of Extract of Belladonna.
- No. 13. One-eighth of a grain of Acetate of Morphia.
- No. 14. One-sixth of a grain of Acetate of Morphia.
- No. 15. One-fifth of a grain of Acetate of Morphia.
- No. 16. One-fourth of a grain of Acetate of Morphia.
- No. 17. Five grains of Tannin.
- No. 18. Ten grains of Tannin.
- No. 19. Ten grains of Mercurial Ointment and ten grains of Camphor.
- No. 20. One-thirtieth of a grain of Atropia.
- No. 21. Half a grain of Extract of Belladonna.
- No. 22. Two grains of Santonin.
- No. 23. Five grains of Calomel and two grains of Santonin.
- No. 24. Two grains of Acetate of Lead and half a grain of Extract of Stramonium.

No. 25. Five grains of Tannate of Lead.

No. 26. Two grains of Extract of Hyoscyamus.

It will be understood that the basic material is the Butter of Cacao, to which is sometimes added White Wax, to give it a firmer consistence, see Vol. ix. No. 1, p. 5.

EXTRACTUM CINCHONÆ FLUIDUM. (CONTAINING AROMATICS.)

As adopted for the Army Supply Table.

BY EDWARD R. SQUIER, M. D.

A Board for revising the Army Supply Table, upon which the writer served many months ago, considered it advisable to adopt some standard vegetable tonic preparation which might be well adapted to the convalescence from typhoid and miasmatic diseases, and to the depression and debility which follows inebriety. The well established value of the Compound Tincture of Bark, (Huxham's Tincture), now abandoned for the extravagant novelties in the way of "Elixirs," "Ferrated Tinctures," and other fashionable distortions of bark, led the writer to propose the following as being well adapted to meet the indications. Calisaya Bark was preferred to the Red Bark because it contains more quinia, and is rather more uniform and accessible. The aromatics were selected for their decided character, and as among the most efficient in rendering the bark more acceptable in enfeebled conditions of the digestive organs.

The skilful management of the ingredients, and the practical details of the process, belong to Mr. John M. Maisch, now of the Army Laboratory at Philadelphia, and are creditable to his well known pharmaceutical ability.

As soon as the preparation was adopted copies of the formula and process were sent to the Surgeon General's Office, and to those who furnished fluid extracts for the army; and now, after having copied it by request eleven times or more, it appears to have become of sufficient importance to be offered for publication. Take of Calisaya Bark, in moderately fine powder, 26½ lbs. Av.

Ginger,
Cardamom,

Calamus, all in fine powder, of each,	11 oz. Av.
Sugar, white, kiln dried,	28 lbs. 6 oz. Av.
Stronger Alcohol,	
Diluted Alcohol, of each a sufficient quantity.	

Moisten the Calisaya bark with one gallon of diluted alcohol, pack it in a conical percolator, and percolate it with Diluted Alcohol until it is exhausted. This requires about 17 gallons of the menstruum, and yields about 18 gallons of percolate.

Distil off the alcohol from the percolate, evaporate the remainder to $3\frac{1}{2}$ gallons, set it aside for 12 hours, and then decant the clear liquor from the sediment.

Mix the aromatics, moisten the mixture with $12\text{f.}\frac{3}{4}$ of Stronger Alcohol, pack it in a conical percolator, and percolate it with Stronger Alcohol until it is exhausted. This yields about six pints of percolate.

Add to the percolate from the aromatics the sediment from the evaporated bark percolate, agitate them together until the sediment is dissolved, and then pour this solution upon the sugar contained in a proper vessel, and stir the mixture well. When the sugar has absorbed all the solution, apply a gentle heat by means of a steam or water bath, and then, as the mixture becomes warm, gradually add in small portions, with stirring, the clear liquid decanted from the bark sediment, being careful so to regulate the additions that the resinous matters be not precipitated. During this part of the process the heat is to be gradually increased, so that by the time the whole of the liquid is added the temperature will have reached 180 or 190° . The whole is then kept heated with stirring until it measures 46 pints, or a little less, when it is allowed to become cold. Finally, strain it through a sieve of 40 meshes to the inch, and make it measure 46 pints by adding a sufficient quantity of diluted alcohol.

Each minim of this preparation represents half a grain of Calisaya bark.

It is a turbid, unsightly preparation of a dark brown color and bitter aromatic taste. After standing, the cincho-tannates of the bark settle partially, and leave a clear, very dark stratum at the

top. It should always be shaken before use, and is often best given in a tablespoonful of wine about ten minutes before meal time. It may be alternated with preparations of iron, but should neither be mixed with them nor be taken near the same time.

The maximum dose is a teaspoonful, but it is often very efficient in doses of fifteen to twenty drops; and it should never be given in the maximum dose when the stomach is very much enfeebled or very irritable. Those conditions which require a very delicate or very light diet are rarely benefitted, and often injured by over-dosing.

Brooklyn, N. Y., March 4th, 1863.

ON THE COMPOSITION OF HYDRARGYRUM CUM Creta.

By R. HAINES, M. B.

The composition of the Hydrargyrum cum Cretā was brought under notice by Professor Redwood in the 'Pharmaceutical Journal' for 1860-61, p. 504; and it was then shown that this preparation invariably contained suboxide, and frequently also protoxide of mercury.

A similar course of experiments had made this fact known to me four years previously, and the results were published in the 'Transactions of the Medical and Physical Society of Bombay for 1855-56,' p. 131; but as I have had subsequent opportunities of verifying these observations, and as the publication in question is not very widely circulated, a few further remarks may not be out of place.

Attention was first directed to the subject by the constant occurrence of violent vomiting which followed the exhibition of small doses, of two or three grains only, of Hydrargyrum cum Cretā, which had been issued from a particular depot. On the powder being brought for examination, I noticed that it had not the pure gray color of the officinal drug; the tint decidedly inclined to pink. It was boiled with water, and the solution being filtered and evaporated to dryness, a very distinct orange-brown residue remained, which gave all the reactions of oxide of mercury, showing, not only the presence of uncombined oxide of mercury, but also its decided solubility in a large quantity of

water. A weighed portion of the powder was digested in dilute acetic acid as long as anything was dissolved. The filtered solution was treated in the cold with excess of hydrochloric acid, and after twenty-four hours, passed several times through a small tared filter, until the liquid came through clear. The calomel on the filter was washed, dried, and weighed, and calculated as suboxide. The mercury in the filtrate was thrown down by boiling with hydrochloric acid and protochloride of tin, and the metal calculated as protoxide. In this way, the specimen was found to contain 8.90 per cent. of suboxide, and 6.54 per cent. of protoxide of mercury.

Another much older and long-condemned specimen of the same drug was then examined, and its appearance at once showed how greatly it was changed. The color was hardly gray at all, but a dirty pink or dull salmon color. Treated in the same way, it yielded 2.19 per cent. of suboxide, and 27.90 per cent. of protoxide. It was observed, that with the exception of a few silicious particles, the whole was soluble in the dilute acetic acid, so that all the mercury had been converted into oxide. But the figures at once show that there is a considerable deficiency of the mercury itself, which, as the drug was prepared in the Government Medical Stores in Bombay, could hardly have existed at first. The 30.09 of mercurial oxides found, is equivalent to 27.95 of metallic mercury, so that the preparation would have originally contained 27.95 of mercury, to 100—30.09 or 69.91 of chalk. But mercury with chalk is prepared with three parts of mercury to five of chalk, and 69.91 of chalk should therefore be found united to 41.95 of mercury, which, increased by oxidation in the above proportion of 27.95 to 30.09, would become 45.16. Adding this to 69.91 of chalk, we get 115.07 parts, containing per cent. 60.75 of chalk, and 39.25 of mercurial oxides, of which 36.46 would be mercury. But the specimen contained only 27.95 of mercury, so that the difference, or 8.51, which is equal to 23.34 per cent. of the original quantity of mercury, has disappeared. This sample had been kept for some years in paper.

To the inquiry as to what has become of this mercury, the most obvious answer is, that it has evaporated; and although the volatilization of this metal at ordinary temperatures in our

European climate is too minute to be appreciable, this is not the case within the tropics. Faraday has long ago shown, that at temperatures exceeding 60° F., or even 50°, a sensible amount of mercurial vapor is formed; but at the ordinary temperatures in Bombay, from 80° to 90°, this volatility is much more decided. A piece of gold superficially whitened with quicksilver, reacquires its yellow color in a few days; and, what is more to purpose, I have frequently seen a few grains of fresh grey powder, folded in paper in a thin layer, to have become perfectly white in a week or two from the escape of the whole of the metal. This increased volatility, at once, I think, explains the loss of mercury in the above specimen, and the rapidity and completeness of the oxidation, both effects being further facilitated by the extreme state of division to which the metal is reduced. In the Government Stores, the process of preparing it occupies often as much as six weeks or two months; the trituration, which is effected in large marble mortars, being carried on for an hour or two a day, as the workmen have leisure from other employments.* I examined some which was still under trituration, having been six weeks in the mortar, and found already .92 per cent. of suboxide, but no protoxide. A sample from the stock in the stores, kept in glass bottles exposed to daylight, yielded 3.22 per cent. of suboxide, and .50 per cent. of protoxide. Another sample gave 1.27 per cent. of suboxide, but no protoxide. A sample from a private establishment, six months in Bombay, yielded .96 per cent. of suboxide; and another from a different establishment, eighteen months in Bombay, 1.52 per cent. of suboxide; but both were free from protoxide.

In the year 1858, I was called on to examine two other samples from the stock of a large public hospital in Bombay. One sample had, in a marked degree, the dirty salmon color above described. It likewise contained no trace of metallic mercury, but of suboxide 2.16 per cent., and of protoxide 29.48 per cent. By a calculation similar to that above given, the deficiency or loss of mercury is found to be 6.22 in 100 parts, or 18.88 per

* The operation is performed only in the rainy season, on account of the ease with which, from the dampness of the chalk, the quicksilver is then killed.

cent. of the original quantity of mercury. The second sample was but slightly changed in color; it contained per cent. 3.82 of metallic mercury, 5.80 of suboxide, and 24.98 of protoxide; showing a loss of 4.06 in 100 of mercury, or of 12.48 per cent. of the original quantity of metal. This sample has been since kept in paper, and it has now acquired the marked pink tinge of the fully oxidized preparation. The metal has disappeared.

These analyses, expressed in a tabular form, may be compared with the corresponding table of Professor Redwood.

	Hg	Hg ₂ O—	HgO—		Hg	Hg ₂ O—	HgO—
1.	?	3.90	6.54	6.	?	.96	0
2.	O—	2.19	27.90	7.	?	1.52	0
3.	?	.92	0	8.	O	2.16	29.48
4.	?	3.22	.50	9.	3.82	5.80	24.98
5.	?	1.27	0				

The following conclusions given in my original report do not differ greatly from those in Professor Redwood's subsequent paper:—

"1st, that the trituration ought not to be carried beyond the point of ensuring the complete extinction of the mercury, for the long-continued trituration after that point is attained divides the metal so extremely, as to promote its too rapid conversion into oxide: 2d, that the preparation should be used in as recent a state as possible; 3d, that it should be carefully protected from the action of the light; and 4th, that the alteration in color from ash-grey to pinkish-grey, which is easily observed, affords a strong presumptive evidence of the presence of peroxide of mercury.

If, as has been shown, this preparation occurs so often in an oxidized state as to be an unsafe and untrustworthy medicine in Europe, still more is this the case in a tropical climate, and it might be well if its use, in India at least, were altogether discarded. A mixture of calomel and starch would probably form the best substitute; and if color were an object, a careful addition of *Æthiops* mineral or lamp-black would at once impart to the mixture the well-known grey tinge.—*Bombay, Nov. 11, 1862.—Lond. Pharm. Jour. Feb. 1863.*

RECENTLY INTRODUCED PREPARATIONS OF IRON.

Mr. Harry Napier Draper gives (*Dublin Med. Press*, Dec. 31, 1862) the following account of three recently introduced preparations of iron :—

1. *Ferri et Quinæ Strychnæque Citras.* Citrate of quinia and iron with strychnia.

Preparation.—Citrate of iron and quinia. 980 grs.

 Strychnia 10 "

 Citric acid 10 "

 Water 10 fluidounces.

In nine ounces of the water dissolve the citrate of iron and quinia, and having dissolved the strychnia and citric acid in the remaining ounce by boiling, mix the solutions, evaporate to a syrupy consistence, and spread on plates to dry in scales.

Physical characters.—Exactly similar in appearance to the citrate of iron and quinia. Its taste is, however, more persistently bitter than that of this salt.

Chemistry.—This compound contains in each 100 parts, one part of strychnia, twenty parts of quinia, and seventy-nine of citrate of iron. The presence of strychnia may be detected in the residue from the evaporation of the chloroformic solution of the alkaloids by the usual color tests.

Physiological action and therapeutical use.—Where the use of is not contraindicated, this salt and the one next to be described, furnish perhaps the safest, if not the best, means of exhibiting strychnia. Five grains contain one-twentieth of a grain of strychnia.

Dose.—From two to five grains.

2. *Ferri et Strychnæ Citras.* Citrate of iron and strychnia.

Preparation.—Citrate of iron 980 grs.

 Strychnia 10 "

 Citric acid 10 "

Proceed as in the case of the preceding preparation.

Physical characters.—Indistinguishable in appearance from the simple citrate of iron. Taste: acid, ferruginous, and persistently bitter: deliquescent.

Chemistry.—A combination of citrate of iron with citrate of

strychnia; 100 parts contain one part of strychnia. The presence of strychnia may be detected by treating the dried and powdered salt with chloroform, evaporating and applying the usual tests.

Physiological action and therapeutical use.—This salt has been successfully employed in dyspepsia arising from atony, in chorea, and in suppressed menstruation.

Dose.—Three to six grains.

3. *Ferri et Zincii Citras.*—Citrate of iron and zinc.

Preparation.—Citrate of sesquioxide of iron 4 ounces.

Carbonate of zinc 1 ounce.

Citric acid 3 ounces.

Solution of ammonia }
Water } A sufficient quantity.

Dissolve the citric acid in ten ounces of water, and add the carbonate of zinc gradually. Before the point of saturation is attained the solution will deposit the citrate of zinc as an insoluble powder. This is to be collected on a filter, and having ascertained by drying a weighed portion of the mass at 212° how much is equivalent to one ounce of dry citrate, this quantity is to be heated in a capsule with the citrate of iron and ten ounces of water. When the iron salt is dissolved, enough solution of ammonia is to be added to effect solution of the citrate of zinc, an excess of ammonia being avoided. The whole is now evaporated to a syrupy consistence, and spread on glass to dry in scales.

Physical characters.—Brownish-green scales. Taste ferruginous and slightly "metallic."

Chemistry.—This salt contains in addition to the citrates of iron and zinc, ammonia, and would therefore be more properly named ammonio-citrate of iron and zinc. Its composition as found in commerce is very variable.

Physiological action and therapeutical use.—This salt is occasionally employed as a tonic in cases where the use of iron is not contraindicated. As an elegant form of administering zinc it is worthy of trial in diseases of the nervous system.

Dose.—Two to five grains.

Am. Jour. Med. Sci., April, 1863, from Brit. Med. Journ.

ADULTERATION OF WAX.

BY BARNARD S. PROCTOR.

Wax, both in its bleached and unbleached conditions, is much subject to adulteration, so much so, that the purity of foreign yellow wax is always considered as very doubtful, and the *impurity* of white cake wax is generally looked upon as almost certain. The foreign matters fraudulently occurring in either variety may be divided into two classes: those which are fusible or soluble in melted wax, at water-bath temperature, and those which remain solid or unmixed with the melted wax under these circumstances. The latter, being so easily detected, are much less frequently present, and require no special notice at present. Resin, fat, and spermaceti are the principal materials to be looked for in the former class. Christison and Pereira both refer to all these materials, and instruct us to examine for resin by the action of cold alcohol, which they say removes nothing from pure wax; this, however, will be looked upon with doubt, since recent analyses of wax show that one of its principles (cerolein) is soluble in cold alcohol. It constitutes four or five per cent. of the wax; it is of a greasy nature, and imparts color, odor, and tenacity, which are wanting in the other two constituents (cerotic acid, the amount of which varies from 22 per cent. downwards, and myricin, which forms the great bulk of the material).

Fatty matters are to be detected, according to the above authors, by the softness, stickiness, the odor and the taste which they impart. Spermaceti, which we are informed is constantly added to white wax to improve its color, is passed over without any means for its detection being suggested; this, no doubt, arises from the analogy in the chemical characters of the two materials affording no ready means by which to recognise an admixture, and from the fact that, pharmaceutically and therapeutically, there is no great difference in the properties and value of the two.

It is a deception, however, which is only tolerated, either in pharmacy or commerce, from the difficulty of obtaining any decided results from any examination not too complicated for the purposes of the retail trader.

A close attention to the physical properties of the sample probably affords the only means of determining its quality, which is suitable as a guide to the tradesman in making his purchases from the wholesale dealer. The following results will be found useful as a guide to the presence and probable quantity of the above adulterants. Good samples of yellow wax and genuine white block wax were melted in a water-bath, with spermaceti, pale amber resin, and lard, in various proportions, as below:—

No.	1. Yellow wax	8	Spermaceti	1
"	2. "	8	"	2
"	3. "	8	Lard	2
"	4. "	8	Resin	2
"	5. "	8	"	1
"	6. Block white wax	8;	Spermaceti	2
"	7. "	8	{ " Resin	1 1
"	8. "	8	Lard	1
"	9. "	8	Spermaceti	8
"	10. "	8	"	24
"	11. "	8	{ " Lard	8 4

All these additions detracted from the hardness and toughness of the wax. The yellow wax was "improved in appearance" by all the additions; its odor was not perceptibly affected by the spermaceti; the lard gave it a slightly greasy smell; the resin was distinctly perceptible in the larger proportion, barely so in the smaller. The white wax was improved in appearance by the spermaceti and lard, but injured by the resin. The odors of the lard and resin were more readily detected in the white than in the yellow wax. In both cases the odor of lard was more readily detected by rubbing the sample upon a plaster spatula heated a little above 212°, but not so hot as to make vapors rise from the wax; the odor of the resin was very distinct when sought in this way, and not less so when the heat was raised to the smoking point.

The rough mealy fracture of pure wax is rendered finer grained, smoother, and duller, by the addition of lard or spermaceti, and becomes sparkling and more granular by the addition of resin.

Pure wax becomes kneadable at about 85° , and its behaviour, while worked between finger and thumb, is characteristic. A piece the size of a pea being worked in the hand till tough with the warmth, then placed upon the thumb, and forcibly stroked down with the forefinger, curls up, following the finger, and is marked by it with longitudinal streaks. The samples Nos. 1 and 2, when worked in the same manner, are softer, curl less by the stroke of the finger, and instead of longitudinal streaks have a granular or flaky surface. No. 3 spreads on the thumb like cerate. No. 4. is softer than the pure wax, more sticky, spreads more readily, curls less, but takes the longitudinal streaks. No. 5, very similar to No. 4. No. 6 is like Nos. 1 and 2 in consistence. No. 7, soft, sticky, and of a bad color. No. 8 spreads like cerate. No. 9, softer than pure wax, capable of being spread with the finger, curls less than pure wax, and takes a granular, mealy surface. No. 10 crumbles into a mealy condition when kneaded. No. 11 spreads like cerate. Perhaps new yellow soap affords the best comparison for the sticky feeling of the samples containing lard, and also the manner of their spreading on the thumb when rubbed.

From a comparison of the samples Nos. 9 and 10 with white cake wax, as supplied by wholesale houses of the highest reputation, I am satisfied that in many cases it is half spermaceti, and, in some as much as two-thirds spermaceti to one of wax, which is supplied to us under this name.—*London. Chemist and Druggist.*

FOR TOBACCO-SMOKERS.

Ferrier, an apothecary in Paris, proposes the following method of depriving the fumes of tobacco of their nicotia, and thus rendering them harmless to the smoker.

Cotton is soaked in a very dilute aqueous solution of tannic acid, strongly expressed and dried. Of the cotton thus impregnated, a pinch is put into a cigar or pipe-holder, consisting of a tube, widened at one end, and terminating at the other in a very narrow opening. The smaller end is put into the mouth—into the other end the cigar or pipe-stem. By the passage of the smoke through the cotton, the tannic acid absorbs all its nicotia. The cotton must of course be renewed from time to time.—*Wittstein's Vierteljahrs.*

G. J. S.

ON ALUMINUM BRONZE.

Lieut. Colonel Strange has communicated to the Royal Astronomical Society some interesting observations on the use of aluminum bronze as a material for the construction of astronomical and other philosophical instruments. Col. Strange remarks that, "the qualities of most importance in instrument making are, (1) tensile strength ; (2) resistance to compression ; (3) malleability ; (4) transverse strength or rigidity ; (5) expansive ratio ; (6) founding qualities ; (7) behaviour under files, cutting tools, &c. ; (8) resistance to atmospheric influences ; (9) fitness to receive graduation ; (10) elasticity ; (11) fitness for being made into tubes ; (12) specific gravity."

Tensile strength.—The mean of experiments made by Mr. Anderson at the Royal Gun Factory, Woolwich, shows that the average breaking tensile strength of aluminum bronze is 73,185 lbs. per square inch, while that of gun metal is 35,040 lbs., the ratio being rather more than two to one in favor of the aluminum bronze.

Resistance to compression.—Experiments made by Mr. Anderson show that no effect was perceptible until 9 tons 2 cwt. per square inch was applied, when the specimen gave .006 of an inch ; on removing the weight an elasticity of .001 was observed, giving the first permanent compression as .005 of an inch. The ultimate amount of compression applied was 59 tons 2 cwt. 1 qr. 4 lbs. (132,416 lbs.), under which the specimen became too much distorted to permit of more weight being applied with any true result.

Malleability.—Mr. Anderson states that, "the qualities of this metal for forging purposes would appear to be excellent ; with the exception of the part heated to a red heat in the shade, all show that it is a good workable material under the hammer almost up to the melting point. Col. Strange adds, that there were specimens exhibited in the Industrial Exhibition, at London, which showed that the alloy could be drawn out under the hammer almost to a needle point.

Transverse strength, etc.—Messrs. Simms found by experiment that aluminum bronze was three times more rigid than gun metal, and upwards of 44 times more rigid than brass ; and,

in regard to its *expansive ratio*, they found this alloy less affected by change of temperature than either gun-metal or brass—a little less than gun-metal, and much less than brass. Its *founding qualities* are such that it produces admirable castings of any size. It does not clog the file, and in the lathe and planing machine the tool removes long elastic shavings, leaving a bright smooth surface. It can be worked with much less difficulty than steel, and notwithstanding its greater cost, the Messrs. Simms think that screws made of it would in the end prove less expensive than steel. It tarnishes less readily than any metal usually employed for astronomical instruments. It is remarkably well fitted to receive graduation, as it takes a fine division which is pure and equable, surpassing any other *cast* metal in this respect. Col. Strange remarks that in its elasticity it is said to surpass even steel, and it would therefore appear to be the most proper material for the suspension springs of clock pendulums. Regarding its *fitness for being made into tubes*, it can be soldered with either brass or silver solder; it can be rolled into sheet metal, and it can be hammered and drawn. Gun-metal does not admit of being rolled, so that hitherto the tubular portions of telescopes and other instruments have been made almost exclusively of yellow brass, an alloy very deficient in rigidity. The *specific gravity* of the alloy containing 90 copper and 10 aluminum, is, according to Messrs. Bell, 7.689, very nearly that of wrought iron.

Col. Strange adds, "it appears from these experiments, and, from the concurrent testimony of those who have given it a fair trial, that the 10 per cent. aluminum bronze is far superior, not in one or some, but in every respect, to any metal hitherto used for the construction of philosophical apparatus, and that for such purposes it may be employed in the dimensions that would be proper in the case of cast steel. All parts which would otherwise be made of steel may with perfect safety, and even advantage, be made of the new alloy, particularly such parts as bolts, and fixing, tangent, and micrometer screws. Its hardness and comparative inoxydizability point it out as peculiarly adapted for pivots, axes, and bearings. If employed for receiving the graduation of circles, the necessity for inlaying another metal will be obviated, by which two advantages will

be gained ; the hammering which forms part of the operation of inlaying, and which, more or less, must cause unequal density and tension in the circle subjected to such treatment, will be dispensed with ; and the effect of inequality of expansion, in the circle and the inlaid strip, will no longer be a cause of apprehension. With respect to the due visibility of divisions cut on this metal, opinions will perhaps differ, I can only say that I should be well content to observe with them."

This alloy has been selected by Col. Strange as the most appropriate metal for the construction of the large theodolite for the use of the Trigonometrical Survey of India. The horizontal circle of this theodolite is three feet in diameter, and the effect of using this alloy will be to keep the weight of the instrument within reasonable limits, notwithstanding its possession of means and appliances not hitherto bestowed on such instruments. In the manufacture of the alloy, Col. Strange says that extremely pure copper must be used ; electrototype copper is best, and Lake Superior copper stands next, giving an alloy of excellent quality. The ordinary coppers of commerce generally fail, owing, it is said, to the presence of iron, which appears to be specially prejudicial. Further, the alloy must be melted two or three times, as that obtained from the first melting is excessively brittle. " Each successive melting, up to a certain point, determined by the working, and particularly the forging properties of the metal, improves its tenacity and strength. It is probable that after several meltings there will remain in combination with the copper a somewhat smaller proportion of aluminum than 10 per cent. The present price of English-made 10 per cent. aluminum bronze is six shillings six pence per pound. This is four or five times that of gun-metal, but a much smaller quantity of the new alloy than of gun-metal will give the same strength ; and when it is considered how small a ratio the cost of material bears to the cost of workmanship in refined apparatus, it will be found that even at the present price of the new alloy its cost is not prohibitory, whilst the advantages attending its use promise to outweigh the increased expenditure."—*L. E. and D. Phil. Mag.*, [2], xxiv. p. 508.

C. Tissier, Director of the Aluminum Works at Rouen, shows that one per cent. of aluminum in copper makes the latter more

fusible, giving it the property of filling the mould in casting, at the same time preventing it from rising in the mould. The action of chemical agents upon it is also weakened, and the copper gains in hardness and tenacity without losing its malleability, thus producing an alloy which has the malleability of brass, with the hardness of bronze.

In transverse strength, this alloy was found to be more than twice as rigid as either brass or copper. Tissier also finds that one part of aluminum, added to bronze consisting of 96 copper and 4 tin, gives an alloy of fine color, of remarkable homogeneity, of great hardness and malleability. During casting, this alloy does not oxydize at all, and it is therefore free from the oxyd coating with which ordinary bronze castings are covered. The transverse strength of the castings of this alloy Tissier finds to be two and a half times that of the original bronze, and that of the hammered alloy is four times as great as that of bronze. Ordinary cannon-bronze, 89 parts copper, and 11 tin, has the same transverse strength as the castings of the new alloy. In reference to the hardness, tenacity, and malleability, it is equal in these respects to aluminum bronze, made of 90 parts copper, and 10 parts aluminum, and, as it is considerably cheaper, it can with advantage be substituted for this more expensive alloy.—*Amer. Journ. Sci. and Arts* March, 1863, from *Polytechnisches Journal*, clxvi, p. 430.

G. J. B.

ON THE INDUSTRIAL APPLICATIONS OF CRYOLITE.

This interesting mineral, which a few years since was only looked upon as a mineralogical rarity, has now become an important article in commerce. Aside from its use as a source of aluminum as suggested by Percy and H. Rose, we learn from recent articles in *Dingler's Polytechnisches Journal*, that it is now extensively employed in chemical works at Copenhagen and Harburg, for the production of caustic soda and salts of alumina.

J. Thomsen (*Ding. Jour.*, clxvi. 443) claims to have discovered in 1850 that cryolite could be decomposed by lime and lime salts, and after perfecting his process he commenced the

manufacture of soda in 1857, and in 1858 erected large works at Copenhagen which now use 40,000 cwt. of cryolite annually. The exploration of the cryolite deposit in Greenland has become so extended that another large manufactory has been erected at Harburg, and others are being put up at Prague, Selicie and Mannheim. It is estimated that these manufactories will consume from 120,000 to 150,000 cwt. (6000 to 7500 tons) of cryolite annually.

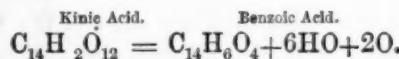
The following method is used for converting the cryolite into soda ash and alumina salts; the cryolite is first ground to a fine powder and then mixed with chalk or ground limestone, in the proportion of 100 parts of cryolite ($3\text{NaFl} + \text{Al}_2\text{Fl}_3$) to 127 parts of carbonate of lime, equal to one equivalent of cryolite to six equivalents of carbonate of lime. This when heated yields six equivalents of fluorid of calcium, aluminate of soda $2\text{NaO} + \text{Al}_2\text{O}_3$, and free carbonic acid. An excess of chalk in the mixture is found to be advantageous, as it renders the charge less fusible. The operation is conducted in a reverberatory furnace similar to those usually employed in alkali works. The compound of alumina and soda is dissolved in hot water and subsequently decomposed by carbonic acid, which last is obtained from the furnace in which the cryolite is decomposed. The carbonate of soda solution is separated from the precipitated alumina and either crystallized, or evaporated to dryness and calcined; it affords a remarkably pure soda ash, being, of course, free from chlorides and containing only traces of sulphites and sulphates, these last due to the small amount of sulphur contained in the coke. The greater portion of this soda solution is, however, converted into caustic soda by means of lime; the commercial article of caustic soda made at Harburg contains about 75 per cent of soda. The precipitated alumina produced by the decomposition with carbonic acid, is washed with water and subsequently dissolved in sulphuric acid, yielding a sulphate of alumina entirely free from iron. (Schwarz, *Dingler's Journal*, clxvi. p. 283.) Cryolite is delivered at Harburg at two and a half Prussian thalers (about \$2) a cwt. No mention is made of the economic application of the large amount of the fluorid of calcium produced in the above operation—aside from its use for making fluohydric acid, it unquestionably can be advantageously

applied as a flux in many metallurgical operations.—*Amer. Jour. Sci. and Arts, March, 1863.*

G. J. B.

ON THE REDUCTION OF KINIC ACID TO BENZOIC ACID,
AND ITS CONVERSION INTO HIPPURIC ACID IN
THE ANIMAL ORGANISM.

According to Lauteman (*Ann. Ch. u. Pharm.*, cxxv. p. 9,) when kinic acid is heated with a saturated aqueous solution of iodhydric acid in a sealed tube for two or three hours at 115 to 120° C. benzoic acid and iodine are obtained. The same conversion is effected by bringing into a retort two equivalents of iodine with one equivalent of phosphorous, and after the two have united, and the product is cold, adding to four equivalents of the crude iodide of phosphorus one equivalent of kinic acid dissolved in water to a syrupy solution. On warming gently, a vigorous reaction sets in, idohydric acid escapes and water distils over. When the iodide of phosphorus has mostly disappeared, the contents of the retort on cooling solidify to a fat-like crystalline mass, from which ether extracts impure benzoic acid. The retort neck is also lined with crystals of this acid towards the close of the process.



The reaction may proceed according to either of the following equations.

1. $\text{C}_{14}\text{H}_{12}\text{O}_{12} + 8\text{HI} = \text{C}_{14}\text{H}_6\text{O}_4 + 8\text{HO} + 8\text{I}$
2. $\text{C}_{14}\text{H}_{12}\text{O}_{12} + 8\text{I} = \text{C}_{14}\text{H}_6\text{O}_4 + 6\text{HI} + 2\text{I}$

Since kinic acid is thus converted so easily into benzoic acid, it occurred to Lauteman to examine whether it would undergo the same change in the animal organism, and appear in the urine as hippuric acid. He found this to be actually the case, in trials upon himself and two other persons, 8 grms. of kinic acid of lime yielding in two experiments 2.2 and 2.7 grms. of hippuric acid, respectively. Kinic acid having been proved by Zwenger and Sievert to exist in considerable quantity in the whortleberry plant, it becomes probable that it may also occur

in various grasses, and that is the origin of the hippuric acid which is found in the urine of pastured animals.—*Amer. Jour. Sci. and Arts, March, 1863.*

G. J. B.

GRADUATED MEASURES.

BY BARNARD S. PROCTOR.

It is a difficult thing to get accurately graduated measures ; and a difficult thing to measure accurately with them when obtained. This is a subject to which attention has been repeatedly drawn, yet there is room for a few more remarks.

Three and four ounce measures are generally graduated down to drachms and half drachms, but these smaller graduations are rarely trustworthy, even with the better class of measures ; those which have the ounces correctly indicated, frequently err to the extent of 25 per cent. in the drachms.

The attraction of the liquid for the side of the measure is a source of inaccuracy in measuring ; the variation thus introduced will be least when the measurement is taken from the general surface of the liquid ; but measures are generally graduated for reading from the highest edge of the liquid, and if the maker and the user of the measure do not compare notes on this point, dissatisfaction is likely to result. Suppose a measure to have been graduated from this capillary edge of the water used, we may measure *water* in it with all requisite accuracy, but a *fluid ounce* of ether or chloroform will not reach up to the ounce graduation because of their deficiency in capillary attraction ; and as the capillary attraction of water stands pre-eminent, all other liquids measured in the same way will be in error, and all in excess of the correct quantity. The extent of this excess will vary from fifty per cent. of the quantity measured, down to a mere nothing ; when drachms are measured in a wide glass, the error is, of course, at its greatest. If makers and users of graduated glasses agreed to measure always from the general surface of the liquid, this source of discrepancy would be removed. If makers graduate from the edge, and users measure from the surface, matters are made worse ; and if several circumstances conspire, we may find ourselves using one-half more of a remedy than we intend. Thus, supposing we measure from

the surface instead of the edge, suppose the graduations indicate a little more than they should, and suppose that we unconsciously held the measure a little out of the vertical, we may measure three drachms each of vin. ipecac., sp. æther nitr. and tr. camph. co., and on putting them into an ounce and a half phial, we find we have only room for one drachm instead of three drachms of acet. scilla, or whatever else may be prescribed to make up the twelve drachms.

It behooves every one who desires a reputation for accuracy to see to his measure and measuring.

The following table shows the number of *minims* (not drops) of various liquids which were required to measure one fluid drachm in a four ounce measure, in which the drachm graduation was accurately marked, measurement being taken from the capillary edge of the liquid.

Water Co.	60	Chloroform	80
Diluted Acetic Acid	60	Ether	77
Liq. Acet. Ammon.	60	Sp. Ammon. Co.	75
“ “ Cone.	65	Sp. Vin. Rect.	74
Liq. Ammon. 880	70	Sp. Æth. Nitr.	72
“ “ 960	67		

The following table will also be interesting for comparison. It gives Frankenstein's results, as quoted in Miller's *Chemical Physics*, and shows the height in decimals of an inch which various liquids rise in a tube 0.04 inch bore.

Water	sp. gr. 1000	rises 0.604 inch.
Acetic Acid	“ 1052	“ 0.355 “
Sulph. Acid	“ 1840	“ 0.331 “
Ess. Lemons	“ 838	“ 0.285 “
“ Turpentine	“ 890	“ 0.266 “
Spirits	“ 927	“ 0.242 “
“	“ 820	“ 0.238 “
Ether	“ 737	“ 0.203 “
Bisulph. Carbon	“ 1290	“ 0.201 “

In conclusion, I subjoin a table showing the extent to which we may err in our measurements when several inaccuracies concur, each of which might be easily overlooked. The first column gives the quantity to be measured, the second the inac-

curacy in the graduation, the third the error introduced by measuring from the general surface instead of the capillary edge, the fourth the result of the measure being held not quite vertical, and the fifth the quantity intended to be measured as increased by the sum of these errors.

	m	m	m	Total.
f 3j.	5	18	17	3j. 40 m.
f 5j.	30	60	30	5j. 4
f 3ij.	60	60	60	3ij. 5ij.

Chemist and Druggist, Feb. 14, 1863.

ON A METHOD OF DISSOLVING ALKALOIDS IN OILS.

BY DR. ATTFIELD,

Director of the Laboratory of the Pharmaceutical Society.

Solution of Quinine in Cod-liver oil is now well known as a remedial agent. The sulphates of quinine are insoluble in oils, but the alkaloid itself is soluble to the extent of about two grains in one ounce of oil. I believe the solution is made by simply adding the quinine to the oil, and either frequently agitating or applying heat till dissolved, or by first dissolving the quinine in alcohol, adding this liquid to the oil, and then heating the mixture till the alcohol has volatilized. By either process only two grains of quinine can be dissolved in an ounce of oil, and the operations are tedious. Exposure to air and heat sets up a tendency to rancidity, the preparation frequently darkens in color, and the alkaloid is often redeposited.

On thinking over the above facts, the idea occurred to me that the *oleates* of the alkaloids, if such salts existed, would probably be readily soluble in oils. Experiment has proved the correctness of the supposition. The preparation of these compounds is exceedingly simple. All that is necessary is to bring together the oleic acid and the well-dried alkaloid and digest for a short time at a temperature not exceeding 212°. The resulting oleates are oily fluids, miscible with oil in all proportions. They are insoluble in water, but soluble in alcohol, and have no more color, odor, or taste than may be possessed by their constituents.

Solution of Quinine in Cod-liver Oil. About twice its weight of oleic acid is necessary to form a clear fluid oleate of quinine, the mixture being kept at the temperature of boiling water for

an hour or two. Its solution in cod-liver oil is not, so far as I have observed, more prone to rancidity than the oil itself, nor is any quinine redeposited from the liquid. Oleate of quinine has the consistence of a soft resin, and is perfectly stable ; any quantity of it therefore may be prepared at one operation, and the product be regarded as a concentrated solution of quinine to be diluted with oil whenever necessary, and to any required extent.

Quinidine, cinchonine, cinchonidine, morphine, thebaine, narcotine, strychnine, brucine, igasurine, veratrine, atropine, piperine, and solanine, are, like quinine, slightly soluble in oil, the proportion being from one to three grains to the ounce of oil. Their sulphates and other ordinary salts are insoluble in oil, and, indeed, in oleic acid also ; the free alkaloids, however, readily combine with oleic acid, forming compounds perfectly miscible with oil.

Though the above, and, doubtless, all other organic bases form definite oleates, their chemical power in this respect appears to be inferior to that of the inorganic bases ; for I find that they—*i. e.* the natural alkaloids commonly met with—cannot take oleic acid from oil and liberate glycerin, as oxide of lead, potash, &c., do. About fifty grains of quinine was heated with three or four times its weight of olive oil for nearly an hour, water was then added, and the whole boiled for a short time. On evaporating the aqueous portion of the mixture, a solid, bitter residue was obtained, but it had none of the characters of glycerin. In another experiment with quinidine no glycerin was obtained. This result might be expected, for were the solution of a few grains of alkaloid in an ounce of oil anything more than a solution, were it due to combination of the alkaloid with the acids of the oil, surely the process would not stop till far more than two grains had acted upon the ounce of oil. Of course, if such exceptional alkaloids as the artificial methyllic and ethylic derivatives of ammonia, the hydrated oxide of tetrythyl-ammonium ($\text{NEt}_4\text{O}_2\text{HO}$) for example, be heated or even agitated with oil, true saponification does take place. Possibly also some natural alkaloid may yet be found having sufficient chemical energy for this purpose, but the ordinary natural ones certainly have not.

Inorganic as well as organic bases appear to combine with oleic acid, and form salts soluble in oils. I find that the oxides of lead, mercury, zinc, and iron dissolve in oleic acid when strongly heated, the products being freely miscible with oils and fats. Doubtless all bases form oleates, thus affording a means whereby such preparations may be administered internally or externally in a true state of solution in oils, ointments, or liniments.

I have not yet succeeded in crystallizing any of the oleates; but the above experiments are, I think, sufficient to establish the fact of their existence, and this is a point of some slight chemical interest. The preparation of them is so simple, that, except in the case of quinine, I have given no details. But were the preparation difficult I should hesitate, to enter minutely into the matter, as at present I do not see any medical or pharmaceutical advantage in combining such substances. When competent medical men desire new combinations of remedial agents, it becomes the duty of the Pharmacist to apply his chemical knowledge in the preparation of them; but when supply precedes demand monopoly is too often fostered, and the *materia medica* overloaded. However important the discovery of new medicinal bodies may be, I think it undesirable to be constantly "ringing the changes" on those already well-known.

I beg to thank Mr. G. F. Wilson, F.R.S., Managing Director of Price's Candle Company, for the oleic acid used in the experiments. It is of a light yellow color, and slight but pleasant odor. It contains a small quantity of solid acid, but this is not objectionable; indeed, for such a commercial article it is remarkably pure.—*London. Pharm Journ.*

BROWNING IRON AND STEEL OBJECTS.

BY M. SAUERWEIN.

Gun-barrels and other objects in iron and steel are browned, either to improve their appearance, or to preserve them from rust, by giving them at first a thin but entire coating of oxide of iron. The following process is successfully employed in Prussia for browning steel barrels:

Dissolve two parts of crystallized ferric chloride, two parts of butter of antimony, and one part of gallic acid, in the smallest possible quantity of water (about four or five parts); with this moisten a sponge or cloth, and rub the object to be browned. Leave it to dry in the air, and repeat the operation several times. Then wash with water, dry, and rub with boiled linseed oil.

Objects browned in this way have a very agreeable dead grey appearance, and the shade deepens according to the number of times the operation is repeated. It is essential to the success of the operation, that solid butter of antimony should be used,—that is to say, a chloride of antimony containing as little free hydrochloric acid as possible.—*London Chem. News, Jan. 31, 1863, from Dingler, Polyt. Journ.*

ON THE DETECTION OF CANTHARIDINE.

By C. R. C. TICHBORNE, Esq.

Some time since I was called upon to examine some brandy, which was suspected to have been tampered with for aphrodisiac purposes, the symptoms indicating cantharides. The suspected fluid was the remains of a glass of brandy-punch, sweetened with sugar. It was quite bright, and free from any *debris* of the flies. Now, if the flies themselves had been used, it is next to impossible that every particle of the elytrae would escape detection by the aid of the microscope; but in such a case as that given above, this conclusive test would, of course, be wanting. Desirous of investigating the subject, I performed some experiments, which proved satisfactorily to myself the ease with which small quantities of cantharidine in solution can be detected, even when mixed with large quantities of foreign extractive matter. The only process given by Taylor for the detection of cantharides is to evaporate to dryness, extract with ether, and to try the vesicating properties of the ethereal extract after evaporation. Taylor then goes on to say, that "this mode of testing is somewhat uncertain, unless the quantity be large; . . . there is, however, no other mode of discovering cantharides in solution, whether as tincture or infusion, than this."* I also found this

* "Taylor on Poisons," page 546.

process very unsatisfactory, which is, probably, due to the loss of the cantharidine when occurring in small quantities from the employment of heat. The chemical tests for cantharidine are too vague to admit of application, therefore we would naturally look to its vesicating properties as the best indication of its presence. The *modus operandi* that I pursued I now give, and it is extraordinary how small a quantity of the poison can be detected with certainty if the details are strictly complied with.

Chloroform is the best solvent of cantharidine that we have, and I should recommend its employment for the extraction. In the experiments above referred to, a tincture was used that represented three grains of cantharides. This was added to half a pint of wine,* and to this, which represented a suspected fluid, was added one ounce of chloroform. The whole was repeatedly shaken during the day, and left to subside until next morning. The chloroform was then carefully separated with a funnel, and passed through bibulous paper. The chloroformic solution was then allowed to evaporate spontaneously to dryness in a watch-glass. A small pellet of lint (which had previously been teased out,) about half the size of a pea, was moistened with a drop of olive oil, and with this little pellet the whole of the film of extractive matter was mopped off the watch-glass. The lint was then placed upon the arm, and covered with a piece of gold-beater's skin. When taken off in three or four hours considerable rubefaction had taken place, and after wiping it off with chloroform a large vesicle was formed. As small a quantity as one grain of flies (= to about 4-1000ths of a grain of cantharidine) was detected in solution by this means. To look for less than this in a medico-legal investigation would be useless, as this is much under a medicinal dose. The smallest dose of the tincture which has been known to destroy life was an ounce = 6 grains of powdered cantharides. In an investigation of the kind our object is to concentrate the active principle, which is diffused through an extensive medium, and bring it to bear upon a limited surface, or, in other words, to bring it to a focus. Of course, in such a manipulation, where there is so small a quantity of the principle, and which principle is in so diluted a form,

* In a second experiment it was added to half a pint of porter.

it requires to be done with the greatest care, in order to avoid loss, and to get it as free as possible from foreign matter, which might seriously diminish its activity.—*London Chemical News*, Feb. 14th, 1863.

ON THE PRESENCE OF ARSENIC IN THE SO-CALLED PURE COMMERCIAL HYDROCHLORIC ACID.—PREPARATION OF PURE HYDROCHLORIC ACID.

BY M. GLENARD.

So-called pure hydrochloric acid, sold by the manufacturers of chemical products, is often as arseniferous as the crude acids. Twice has M. Glénard, at a year's interval, examined numerous specimens of hydrochloric acid considered as pure. In two specimens very recently examined he found 2.5 grammes of arsenious acid per kilogramme.

According to M. Glénard, the presence of arsenic in hydrochloric acid may prove very injurious in the preparation of certain pharmaceutical products. It is, then, important that pharmacists should be aware of this fact, and abstain from employing hydrochloric acid which they have not previously tested carefully. The examination is attended, fortunately, with no difficulty. It is only necessary to mix the acid to be tested with its volume of a solution of hydrosulphuric acid, or to pass into it, during a few minutes, a current of this gas; or, better still, to throw into it a few morsels of artificial sulphide of iron. Under these three conditions, the acid, if it contains arsenic, will become troubled, owing to the separation of the yellow sulphide of arsenic.

But how to obtain pure hydrochloric acid? M. Glénard proposes—

1. The direct preparation of this acid.
2. The purification of commercial acid.

In the direct preparation, the first step is to ascertain that the sulphuric acid is free from arsenic; otherwise, the arsenic, transformed during the preparation of the hydrochloric acid into very volatile chloride of arsenic, will escape with the acid, and with it become condensed in the water. The first thing to do is to eliminate the arsenic from the sulphuric acid. To effect

this, the acid is diluted with half its weight of water, and to it is added a little hydrochloric acid, and then a current of hydro-sulphuric acid gas is passed into it. The arsenic soon separates in the form of sulphide. It is next filtered through a funnel packed with amianthus, then heated in a capsule, to expel the excess of sulphuretted hydrogen, and to bring it to 60° of Baumé's areometer. The sulphuric acid thus purified is employed in the ordinary way, and furnishes perfectly pure hydrochloric acid.

After describing the simple and ingenious process which consists in disengaging, by means of concentrated sulphuric acid, the hydrochloric gas contained in commercial acid, and in condensing this gas in distilled water, M. Glénard proposes the following method.

Into the crude acid to be purified a current of hydrosulphuric acid is passed until all the arsenic is precipitated.

The sulphide of arsenic is separated either by letting the acid stand or by filtering it through a funnel packed with amianthus. Should the filtered liquid contain excess of sulphuretted hydrogen, some grammes of a concentrated solution of perchloride of iron are added, which destroys the hydrosulphuric acid, becoming reduced to protochloride.

As the hydrochloric acid would then contain only fixed matters, it could then be rectified. Hydrochloric acid gas is displaced by means of sulphuric acid freed from arsenic.—*Lon. Chem. News, Feb. 14, 1863, from Journal de Pharmacie et de Chimie.*

ON A PROCESS FOR EXTRACTING SODA FROM CRYOLITE.

By M. J. BING.

Take eight tons of cryolite to eleven tons of chalk or calcareous stone, and pulverize separately, as finely as possible, by vertical mill-stones, and sift, still separately, through movable tammies; then mix, and re-grind by vertical mill-stones. (The portions of cryolite and chalk remaining in the tammies are again ground and sifted separately, then mixed and re-ground as in the first operation.)

The mealy powder produced in this way is placed in furnaces

constructed for the purpose, wherein it is baked and constantly stirred with iron instruments. During baking, the material must be carefully watched, to prevent it from fusing. When at white heat, it is taken from the furnace, and, when sufficiently cooled, to be sifted through an iron sifter ; the lumps which may have agglutinated during the baking are separated. (After eight days, when, from the influence of the air, these morsels have lost some of their coherence, they are ground before being re-baked.)

The calcined product is sifted and put into washing-tubs, and boiling water poured upon it, until no more soda remains to be extracted. The lixivium is conveyed into reservoirs intended to receive the carbonic acid destined for the saturation. The carbonated lixivium is directed into receivers at the bottom of which clay is deposited. After clarification, the supernatant liquid is pumped, either into evaporating pans to be reduced to the point necessary for crystallization, or into calcining vessels, if salt or soda is to be produced.

Carbonic acid is obtained from the furnaces used to calcine the mixture, whence it is conducted by canals into a purifying apparatus, and thence into its reservoirs (iron cylinders ; the boilers of a steam-vessel will answer the purpose.)

The operation, during which three tons of coal are burnt, produces 175 kilog. of crystals of soda and 16 kilog. of pure alumina per 100 kilog. of cryolite. Theoretically, the 100 kilog. of cryolite ought to yield 204 kilog. of crystals of soda, and 24 kilog. of alumina. The alumina is used in manufacturing alum, sulphate of alumina, aluminate of soda, or aluminium.—*Lond. Chem. News*, Feb., 1863, from *Rép. de Chimie Pure et Appliquée*.

[NOTE. The reader is referred to page 244 for another version of this process. We are not informed whether cryolite has been discovered in other places besides Greenland, or whether it may be economically imported from that country. As a source of both soda and aluminium it presents advantages to the manufacturer.—EDITOR AM. J. PH.]

ON THE SAGINAW VALLEY SALT REGION OF MICHIGAN.

By S. S. GARRIGUES, PH. D.

[Some time ago we received an extra of the "Saginaw Weekly," giving an account of the natural productions of the Saginaw Valley of Michigan, from our friend Samuel S. Garrigues, of East Saginaw, and give the following extracts from it in reference to the salt manufacture:—
EDITOR AMER. JOUR. PHAR.]

History of the Salt Discoveries.

The earliest intimations of the existence of a salt basin underlying the Saginaw Valley were given by the lamented Dr. DOUGLASS HOUGHTON, the eminent State Geologist appointed soon after the organization of the State Government in 1837. Dr. Houghton reported to the Legislature in 1838, as the result of his explorations up to that time, the discovery of many indications of salt springs on the Tittabawassee, Cass and Flint rivers and in various other portions of the State. The Legislature of 1838 passed an Act for the improvement of the State salt springs on lands donated by the General Government to the State and selected for that purpose, and authorizing Dr. Houghton to make further examinations and institute experiments to ascertain the value of these salt indications. He accordingly commenced operations on Grand River and on the Tittabawassee River, an important tributary of the Saginaw, just below the mouth of Salt river, and some 25 miles (direct) from the Saginaw river. At this place a well was bored to a sufficient depth to obtain a weak brine, but the work was suspended in the general collapse of State improvements soon after. No further efforts in the line of salt discoveries were made for some twenty years. In the mean time, evidences of the existence of this salt basin were accumulating in various ways. In the progress of improvements in digging wells in various localities, veins of water had been struck strongly impregnated with saline properties—one of them at Birch Run, midway between East Saginaw and Flint, and five or six miles from the river; dug for the purpose of supplying a saw mill with water for making steam. Individuals, however, were impressed with the belief that the saline resources of this Valley

would yet be of importance, and looked forward in firm hopes of their development at some future time. Among them was Dr. GEORGE A. LATHROP, who, with a taste for geological investigations, had become fully convinced of the existence and richness of the yet undeveloped salt basin beneath us, and his arguments and enthusiastic confidence tended greatly to inspire others with the same views. During the fall of 1858, Dr. Lathrop visited the State well on the Tittabawassee, brought home a bottle of the brine, which was evaporated on a stove, in Mr. Mott's office in this city, and a few ounces of salt produced—the embodied *prophecy* of more extensive results. Public meetings of citizens were held to take the initiatory steps toward boring for salt as an experiment. The same subject was discussed through the columns of the *Saginaw Enterprise*, the only newspaper then published in the County. Petitions were presented to the Legislature for an act to encourage the manufacture of salt by offering a State bounty; and other steps taken to initiate the work. During the session of 1859, the Legislature in compliance with the wishes of the citizens of this region and the Grand River Salt interest, passed an act giving a State bounty of ten cents per bushel for all salt manufactured within the State.

In April, 1859, the EAST SAGINAW SALT MANUFACTURING COMPANY was organized with a capital of \$50,000, under the general law of the State in regard to corporations. The stock of this Company was taken entirely by citizens of East Saginaw and parties interested in real estate here. The first Board of Directors consisted of Dr. George A. Lathrop, William L. P. Little, Charles B. Mott, William L. Webber, William F. Glasby, Dr. H. C. Potter, Jas. L. Ketcham, Moses B. Hess and George W. Merrill, of which Dr. Lathrop was chosen President. The grounds now occupied by that Company's works were purchased of Jesse Hoyt; a committee of the Board of Directors, consisting of Capt. Stephen R. Kirby, William F. Glasby, and George W. Merrill, appointed to visit the Syracuse and Montezuma salt works to learn the apparatus used and the manner of boring and tubing the wells. This committee, on their return, superintended the construction of the first tower and drilling apparatus. Operations were commenced about the first of May,

1859, and the first well was completed to a depth of 670 feet in ten months thereafter. Thus, from the inexperience of the first operators, and the various difficulties encountered, the time occupied in boring the first well was three times as long as now required. While the boring of this well was in progress—while the drill was penetrating the overlaying masses of earth and rock, to reach the treasures below—the progress of developments was eagerly watched by those engaged in the movement and others interested in the result.

The following table shows the strength of the brine obtained at various depths:

At 90 feet,.....	1 degree.
" 102 "	2 "
" 211 "	10 "
" 212 "	14 "
" 487 "	26 "
" 516 "	40 "
" 531 "	44 "
" 559 "	60 "
" 569 "	64 "
" 606 "	86 "
" 636 "	90 "

Immediately after the completion of well, small quantities of salt were produced in a temporary arrangement of three or four ordinary kettles; but the erection of pumping apparatus, vats for storing and settling the brine, and blocks of kettles, took some three months longer, and the manufacture of salt as a business was commenced in July, 1860, when a block of 50 kettles was put in operation under the superintendence of Dr. H. C. POTTER, who had taken an active part in the previous operations and experiments.

The East Saginaw Company have the most extensive works of any company or firm on the river. Their first well has been continued to a depth of 743 feet, and a new well under the same roof, has been bored to a depth of 806 feet—entirely through the salt bearing rock. This well is also larger than the first one, the tubing being $4\frac{1}{2}$ inches inside; (the first one being but three inches) and a proportionate larger supply of brine is obtained. More recently the same company have sunk another well about one hundred rods further North. They have now six blocks of kettles in operation, and 500 solar vats.

Geological Formations.

In boring the wells, the drill passes through various formations of earth, mostly hard clay, sand and gravel, with occasional layers of marl, &c. Usually at a depth of about 100 feet the rock is struck. A tubing of iron is put in from the surface down to the rock, to keep it from caving in, and especially to guard against the influx of quicksand. The size of the well, above the rock, is from five to seven inches; through the rock about two inches less. As soon as the rock is struck, and sometimes before, the water brought up by the clearing pump gives indications of salt brackish taste and about one degree of strength by the salometer test. On progressing downward the salty indications gradually increase. Not always, however, in precise proportion to the depth attained, for the brine is found only in one kind of rock—a porous sandstone.

Various strata of overlying rocks are passed through in boring to the depths commonly required—sandstone, limestone, shales, and thin seams of coal. The salt-bearing rock is a porous sandstone. The stratum known to geologists as the *Parma sandstone*, “underlying the Woodville sandstone and coal measures” struck at a depth of about 300 feet or more in the vicinity of East Saginaw, Salina, &c., is a saliferous rock, yielding a brine of from 5 to 14 degrees. But the great depository of the saline resources of this Valley is the “*Napoleon sandstone*,” which is usually struck at a depth of about 600 feet. In order, however, to secure an ample supply of strong brine, this rock is usually penetrated from 150 to 200 feet, or a total depth from the surface of from 650 to 850 feet. The depth of the salt bearing rock varies in different localities. At the wells in the vicinity of Bay City the salt rock was struck at 100 to 150 feet less depth than those above, showing a dip of the rock south. But in the opinion of Dr. WINCHELL, the present State Geologist, the Bay City wells get their brine from the *Parma sandstone*, the same from which the weak brine is found in boring the up-river wells. If this theory be correct, the dip of the rock is to the North, instead of South; the *Parma sandstone* being reached here at a depth of 300 to 350 feet: there at 450 to 800 feet. Dr. Winchell thinks that this stratum, yielding a brine of

5 degrees at Salina and 14 degrees at East Saginaw, wells would increase in proportion to its greater depth and yield a brine of 60 to 70 degrees at or near the mouth of the river. He is of opinion that the Napoleon sandstone there lies at a depth proportionately lower than that from which they now draw their supply. This theory would seem to be strengthened by the fact that one well in that vicinity (Fitzhugh's) has been bored to a depth of 1000 feet, and yields a very strong brine, said to stand at 98 degrees.

The Salt Blocks—Process of Manufacture.

A "salt block," properly speaking, consists of fifty or sixty kettles and the stone and brick work in which they are set. The kettles are set in two rows, over two arches, reaching from the mouth or furnace to the chimney. These arches are close together, merely a dividing wall separating them and the kettles are set close together in each row. The arches, in front, are about three feet deep, the bottom gradually rising as they recede, so that under the back kettles the space is only ten or twelve inches. The front kettles evaporate much faster than the back ones. To run one block for 24 hours takes 6 to 6½ cords of wood, and from 40 to 50 barrels of salt are produced. Each block is housed under a building 75 to 100 feet long, and about 20 high in the centre, with sheds on each side containing the bins where the salt is thrown as fast as manufactured. After remaining in these bins a few days for further drainage, it is packed in barrels for market.

When the works are in operation, an engine is kept running for pumping the brine, which, although it rises to the surface in most wells, when not drawn from, requires to be pumped a distance of 100 to 150 feet. The brine is carried in pump logs to the vats or cisterns near by flowing in, fountain-like, through a spout, over the top. From these vats another set of pump logs carries the brine into the block house, and along the top of the brick work between the two rows of kettles, from which a spout extends over each kettle, in which a plug is inserted. By withdrawing the plug a few moments the kettle is readily filled.

But before proceeding further we introduce another branch

of the subject—the *strength and character of the brine, the nature of its impurities and the method of getting rid of them*; in fact, a part of the process of manufacturing.

The Brine.

The brine is stronger in saline properties than that of the Onondaga springs or any other brine in the United States from which salt is manufactured. It varies a little, though not very greatly, in the different wells—most of them running from 75 to 85 degrees by the salometer. To make this test understood by those unacquainted with it we should explain that 100 degrees means *full saturation*—as much saline matter as water will hold in solution. To take a pail of fresh water and dissolve salt in it until no more could be dissolved, would illustrate full saturation, and would measure 100 degrees by a correct salometer. The salometer therefore, tests the brine by its density or gravity, and on the same principle that a farmer making brine for his beef or pork tests it by throwing in an egg or a potato, to see when the brine is strong enough to float it. This explanation is necessary because the uninitiated are apt to imagine that 100 degrees or “100 per cent,” (the term sometimes used) means *all salt*; which is far from the truth. Of the 75 to 85 degrees of saline matter, something over three-fourths are *chloride of sodium*, or *common salt*, and less than one-fourth other ingredients, known in manufacture by the general term *impurities*. An analysis of brine from the East Saginaw Co.’s well, made by Prof. CHILTON, in May, 1860, gives the following result:

Specific gravity at 60° Fahrenheit.....	1177
In 100 parts of brine, Salometer 90° are found,	
Chloride of sodium.....	16.8710
Chloride of calcium,.....	3.2873
Chloride of magnesium,.....	1.7743
Bromide of sodium,.....	.0401
Sulphate of lime,.....	.0982
Carbonate of lime,.....	.0500
Silica and alumina,.....	.0245
Carbonate of iron,.....	.0116
Water,.....	77.8430
	100.0000

In 100 parts of dry solid matter there are,	
Chloride of sodium,.....	76-143
Other substances,.....	23-857
	100-000

The total percentage of solid matter is 22,157

In one wine pint there is, of solid matter,	
Chloride of sodium.....	1229-72 grains.
Other saline matters,.....	385-30 "
	1615-02 "

In order to dispose of these impurities, the brine is kept standing in the vats five or six days before boiling, to *settle*, (the process being facilitated by a small quantity of slackened lime thrown in,) when a dark reddish sediment is deposited at the bottom consisting of iron and other impurities. There are usually two or more cisterns, from which a block of kettles is supplied, one of them being filled and left to settle, while another, previously filled and settled, is being used. While the brine is heating after the kettles are filled, and before boiling commences, a scum rises and is taken off; and a flat pan placed at the bottom, with an upright handle in the centre, catches another portion of sediment which is drawn up, and thrown out. As will be seen by the analysis, this brine contains but a very minute quantity of *sulphate of lime*, (plaster) a very troublesome system in the Syracuse brine, where it is found in much larger proportion, clogging the kettles with a hard coating requiring picks to remove it. The deposits on the kettles here are about 60 per cent. salt, soluble and easily cleansed with fresh water.

In the Saginaw brine the only really troublesome substance is the *chloride of calcium*, a subtle, adhesive substance, which retains and gathers moisture and never becomes dry. It does not crystallize like salt, but mostly remains in the brine after the salt is dipped out, forming the principle ingredient of the "bitter waters" which are dipped out of each kettle after the salt is removed. If the bitters are not dipped out often enough and become too strong, this chloride is liable to adhere in small quantities to the salt crystals, giving them a kind of moisture requiring weeks or months to become entirely dry.

After a kettle of brine has boiled a short time, the crystals

of salt commence forming on the top and fall to the bottom. When the quantity of brine is boiled down to about one-half, the salt is dipped out with a long-handled pan and thrown into a basket standing over one side of the kettle, for drainage. The bitter water is thus drained off, carrying with it the *chloride of calcium* and other impurities. "This thorough drainage is considered the important point in our manufacture," as remarked by Dr. Potter, in a letter quoted by the State Geologist. After standing some time in the baskets the salt is thrown into loose bins arranged on either side of the block, where, after remaining some days for further drainage, it is packed in barrels for market. The bitter water remaining in the kettles is bailed out after every third or fourth drawing off of salt. If this bailing out is neglected too long, the bitterns increase to such an extent that they act on the iron, rusting the kettles and coloring the salt, and are also more liable to adhere to the crystals of salt instead of passing off in the drainage. To make a No. 1 article of salt, the bitterns should undoubtedly be dipped out every time the brine is boiled down. This, though expensive in the waste of brine, is the only way known to free the salt entirely from the chlorides, and will probably pay better in end.

Expense of Salt Works.

The expense of boring wells and putting down the tubing is from \$1.50 to 2.00 per foot. It is usually done by men who make it a business, and contract to sink wells at so much per foot, or at a certain price for the job, providing it does not exceed a certain depth named.

The salt wells, like other artesian wells, are bored by a drill attached to one end of a balance beam worked by steam. The drill is somewhat in the shape of an iron wedge, but made of hardened steel. It is not forced down, but being drawn up by the machinery, it falls by its own weight and the weight of rods attached, striking and chipping the rock at every stroke. The operator in attendance turns the rod around a little each time, making it strike in a different position. As the drill progresses downwards, more rods are attached. When the drill becomes obstructed by the chips or borings, it is taken up by the same rods, and the chips brought up by the pump, the valves of which

opens on striking them, and close when starting up, retaining and bringing them up. The brine from the bottom of the well, while boring is drawn up in a similar manner. When a well is sunk to the depth required, an iron tubing is put down, reaching from the surface to within a few feet of the bottom. The tubing is in pieces 16 to 20 feet long, and screwed together at the joints, and has packing around the lower section, near the end, to shut out the weaker brine from the upper strata getting mixed with the stronger brine below. This rock tubing, from the surface to the rock, is surrounded by another and larger one—the *earth tubing*, previously alluded to. The cost of tubing varies with the size. The size ordinarily used costs about \$1 per foot. The total cost of a salt well of say 750 feet depth, including tower and engine house, boiler and engine for drilling (afterwards to be used for pumping,) is ordinarily about \$4,000. For a block of 50 kettles, (weight from 600 to 850 lbs.) 3 cents per lb., average \$20 per kettle, or \$1000 in all; add \$1,000 more for stone and brick work for arches, the building in which it is situated, with salt bins, reservoirs for brine, pump logs, &c., and \$500 more for *contingents*, and we have a total of \$7,000 for a complete salt works with one block in running order. But one well will easily supply two blocks; and an additional block can be erected and the facilities for manufacturing doubled, at an additional cost of two thousand to twenty-five hundred dollars more. So that complete works with *two blocks* in running order may be estimated to cost from \$8,000 to \$9,000. This, of course, does not include the cost of the grounds, which vary according to location and fancy.

Anywhere along the banks of the river, from its mouth 30 miles upwards, or on the Cass or Tittabawassee, near the mouth, "Salt locations" may be chosen. Not that salt cannot be made as well, probably, a few miles back from the rivers, but a river front for shipment is considered almost indispensable. Numerous land-owners have platted out their land in three to five acre lots, in long narrow strips fronting on the river. Of course there is room for a great many such salt locations along the river; but, from their varying situations, vary much in value. Convenience of access by roads, for hauling wood—the expense of docking,

and other circumstances, affect the value. A location in the low marshes between Zilwaukie and Portsmouth, where the surface may be overflowed in high water, and would need filling up or docking over, at much expense, are not as valuable as on a dry and level bank. Salt locations have been sold at all prices, varying from \$100 to \$1,000 per acre. Speculators, of course, have had a finger in the business, and have generally secured a pretty large share of the first profits.

Expense of Manufacture.

The expense per barrel of manufacturing salt by the boiling process, and packing it for market, as figured up by the East Saginaw Company in November last, since the rise in price of labor and fuel, is as follows:

Labor,.....	\$0.20
Wood,.....	.35
Barrels,.....	.35
Packing,04
Nails, branding, &c.,.....	.02
National tax,.....	.11
 Total,	 \$1.07

These figures are probably abundantly high for the coming year. The price of salt will not probably fall below \$2, during 1863, which will afford a handsome profit.

A block of kettles produces from 40 to 50 barrels of salt in 24 hours; 45 barrels is probably a fair average, and requires from six to six and a half cords of wood.

NOTES ON THE EXTRACTION AND ESTIMATION OF SOME
OF THE CRYSTALLINE PRINCIPLES OF OPIUM.*

BY R. HAINES, M. B.

Professor of Materia Medica, Grant College, Bombay.

In the year 1856, learning that there lay in the medical stores some 300 or 400 lbs. of Khandeish opium, unsaleable on account of adulteration, and for the same cause not considered suitable

* From the *Transactions of the Medical and Physical Society of Bombay.*

for issue for medical purposes, I got permission to make a preliminary trial upon it, and, having found that it would yield five or six per cent. of muriate of morphia, I made an offer to the medical board to extract all the morphia from it in the form of muriate. The offer was accepted, and I commenced operations, in the first place, upon 200 lbs.

In choosing the process to be adopted, I was obliged to have regard to the nature of the appliances at my disposal. My vessels and furnaces being but small, I preferred to avoid, if possible, great boilings and filtrations. The extraction, therefore, with a sufficient quantity of cold water, and the filtration and expression, were effected at the medical stores, though not, I fear, very completely.* The filtered liquors being collected, solution of ammonia was poured in with vigorous stirring, until a distinct ammoniacal odor was perceptible. About 1 lb. was required for every 10 lbs. of opium. The first effect of the ammonia was to precipitate a vast quantity of resin, which, by stirring, soon balled together into a tough, pitchy mass. This could be at once removed. After some hours the morphia was deposited at the bottom and sides of the vessel in distinct granular crystals of a pale brown color. The crystals, after being washed, were dissolved in hydrochloric acid, and the hydrochlorate of morphia purified in the usual way. The resinous mass I found, rather to my surprise, to contain, besides the greater part of the narcotine of the liquid, a large quantity of morphia enclosed as crystals within it. In order to utilise this morphia, I first attempted to treat the mass like the first crystals, by solution in hydrochloric acid and crystallisation; but I found that so viscid and pitchy a mass resulted that the crystals would hardly form in it. I was, therefore, driven to endeavor to get rid of the resin before operating upon the enclosed morphia. Treated with twice or thrice its weight of boiling alcohol, the resin softened and dissolved, but, as the temperature fell, the greater part separated. The spirit was poured off, and the resinous mass, while still warm and soft, was folded in strong calico, and subjected to very gradual but ultimately powerful

* The marc of this portion, and of the succeeding 100 lbs., was unfortunately not preserved, as it might have been, for the extraction of the narcotine.

pressure. An exceedingly tough black mass was very slowly forced out, and at last a light brown cake of morphia and narcotine was left in a state fit for solution in acid. Although I had carefully studied the accounts given of the various processes for extracting morphia, I had not been led to expect exactly this behaviour of the aqueous solution when treated with ammonia.

In a subsequent operation, the precipitant used was carbonate of soda. Less resin was thrown down, and the morphia was lighter in color, but not quite so abundant, and the precipitation did not appear to be so complete. The watery solutions from which the morphia had been precipitated were not thrown away, but were preserved for the operations presently to be noticed.

One reason why I adopted the above process in preference to that of Gregory was, that the results of a preliminary trial on a few pounds of opium of what I believed to be that process, had been unfavorable, for, after the addition of chloride of calcium and evaporation to a syrup, the hydrochlorate of morphia crystallised with extreme slowness and very imperfectly, so that, after standing a month, more than half the salt remained in solution, and it was at last necessary to separate the morphia by diluting the expressed fluid with water and precipitating with ammonia. In this case I followed the process as detailed in the Edinburgh Pharmacopœia of 1841, which, as I afterwards found, omitted one most essential step, without which, in fact, complete success is impossible. In the process as originally devised by Gregory in 1831,* the directions are to add the chloride of calcium to the concentrated liquid, and then to pour the whole into a large quantity of cold water, which causes the separation of abundance of resinous flocculi, after straining off which the liquid may be again evaporated to crystallisation. Not only is this step omitted in the Edinburgh Pharmacopœia of 1841, but it is omitted by Gregory himself in his "Handbook of Organic Chemistry." The London College, however, in the Pharmacopœia

* I cannot find the original paper, and, therefore, I have drawn my account from Geiger und Liebig's "Handbuch der Pharmacie," 1843, Band i., s. 1191—a work which for fulness and accuracy cannot be too much commended.

peia of 1836, substituting chloride of lead for chloride of calcium, does not neglect this part of the process. It is, in fact, a most essential one, for the quantity of resinoid extractive matter got rid of by this simple means is something enormous, and the liquid now freed from it leaves on evaporation a thin, aqueous syrup, which scarcely interferes with the crystallisation, instead of the tough, viscid, black mass of the former case.

The last portion of the opium, consisting of 71 lbs., was treated in this way by the chloride of calcium process, and with perfect success. The total yield of pure hydrochlorate of morphia from the first 294½ lbs. of opium by the precipitation method was 14 lbs. 5 oz. 6 dr., or 4.87 per cent.; that of the last 71 lbs. 11 oz. of opium, 4 lbs. 1½ oz., equal to 5.71, or nearly 5½ per cent., after the extraction of the codeia; the increased quantity in the latter case being, perhaps, partly due to the greater care taken in exhausting the opium, which was done by myself in the College laboratory. In this way a total of 18 lbs. 6 oz. 14 dr. of hydrochlorate of morphia of the best quality has been supplied to the stores at the mere cost of a few pounds of solution of ammonia and of hydrochloric acid, and of a hundredweight of coal and charcoal.

I have tried at various times most of the processes that have been recommended for the extraction of morphia, with the exception of that of Merck,* and I have certainly found no reason to dissent from the preference universally shown by English manufacturers for Gregory's method, taken as a whole, and especially with the proviso above noticed. The substitution, by the London College, of chloride of lead for chloride of calcium has met with disfavor, partly by reason of the expense of the lead salt, and partly from the large quantity of water required to dissolve it. But I am not sure that a little modification would not remove these objections, and ensure a more abundant yield of morphia. I have been astonished to observe what an exceedingly copious dark precipitate is formed in the opium residues by solution of sugar of lead in Anderson's method, and the great clearing and thinning in the subsequent extract which results; a thinning which, in fact, has the effect of allowing the

* Geiger und Liebig's "Handbuch der Pharmacie." Band I, s. 1188.

almost immediate and copious crystallisation of one of the constituents, narcein, which, otherwise, may remain for months in solution. I would propose, then, that after the first evaporation of the watery solution, and the separation of resinous matter by dilution with water, the liquid be precipitated with a saturated solution of acetate of lead, added as long as a deposit is formed. The meconic and sulphuric acids are completely removed, with a great abundance of resinoid substances, but none of the crystalline bases. The liquid is filtered through cloth. To save trouble in washing out the bulky precipitate, the best method would be, after one or two affusions of water, to fold it in calico and squeeze out the liquid in the press, and thoroughly dry the precipitate; it may then be powdered, and the soluble matter may be readily extracted by digestion in water. The liquid being now brought to the boiling-point, a solution of chloride of calcium, equivalent in quantity to the acetate of lead used, is to be added. On evaporating the filtered liquid to a small bulk, almost the whole of the remaining lead will crystallise out as chloride, after separating which by filtration, the evaporation may be continued until the muriate of morphia crystallises. The small remaining portion of lead will be effectually got rid of in the final purification with animal charcoal. In this way all the advantages of the use of the lead salt are obtained without the expense and trouble of preparing and dissolving the chloride of lead.

In all the forms of Gregory's process a small portion of the morphia of course remains in solution in the black syrupy residue; it must be eventually extracted by diluting with water and precipitating with ammonia. Mohr's process, which consists in pouring the watery solution of opium into boiling milk of lime (in which the morphia, at first precipitated, speedily re-dissolves), filtration, evaporation to a small bulk, and precipitation with muriate of ammonia, is admirably adapted to experiments on a small scale, if sufficient time can be allowed for the thorough washing of the lime residue, and for the evaporation. I have generally found that it afforded a better yield of morphia, and in a purer form, than the other methods; but on a large scale it is not suited, I should think, to the appliances of a general labora-

tory, from the difficulty in boiling such large quantities at once, and in the filtration of the bulky mass of lime and resin.

The mother-liquors from the first 300 lbs. of opium, after precipitation by ammonia, were operated on with the view of obtaining the narcein and meconin. Not being at the time acquainted with the recent researches of Anderson,* I could only consult for this purpose the old papers of Pelletier and Couerbe, their respective discoverers.† The process described was simple in the extreme. Pelletier, in obtaining narcein, treated the mother-liquors with baryta water to separate meconic acid, and then with carbonate of ammonia to separate baryta; after the requisite filtrations, the liquid was evaporated to a syrup, when narcein crystallised after a time, and was obtained by pressing out the liquid through linen. Couerbe, to obtain meconin, omitted the treatment with baryta, and merely evaporated to a syrup, after precipitating the morphia and narcotine with ammonia: after fifteen or twenty days meconin and narcein crystallised together. Since Couerbe obtained both principles by the simpler process, and Pelletier only one by the more complex, I of course adopted the former plan. The liquids were evaporated to a syrup, and set by for a month; nothing, however, could be found—neither narcein nor meconin. But after standing for months some ounces of small hard brown crystals had formed at the bottom, which turned out to be narcein. Meconin could not be discovered. Acting on the known solubility of meconin in ether, I attempted to obtain it by shaking up the syrupy liquid with ether, and separating and distilling off the ether. There remained a small quantity of what appeared to me to be a resin, and I threw it away. I have no doubt now that it was chiefly meconin. From repeated losses of this kind one becomes at last extremely cautious in throwing away even worthless-looking dregs and residues; and the eloquent words of Sir John Herschel on the use of the residues, ever and anon recur to the mind with a full feeling of their force and truth.‡

* *Trans. Royal Soc. Edin.*, vol. xx., part iii., p. 347. Liebig und Kopp's "Jahresbericht," 1852, s. 537.

† *Ann. Chim. Phys.*, tome l., pp. 240 and 337.

‡ "Discourse on the Study of Natural Philosophy," § 161, *et ante*: "It was a happy thought of Glauber to examine what everybody else threw away."

In treating the mother-liquors of the last portion of opium, 71 lbs., the method adopted by Anderson was put in practice. The liquid was first diluted with water, and the copious deposit strained off; it was then precipitated with ammonia, which threw down, with much resin, morphia, narcotine, thebaia, and a portion of the papaverine. The filtered liquor was neutralised and mixed with solution of sugar of lead in slight excess; after filtering off the very copious dark precipitate, the excess of lead was removed by sulphuric acid, the sulphate of lead separated, and the acid neutralised by ammonia. The liquid was now evaporated to a thin syrup. In a few days it appeared semi-gelatinous, owing to the presence of a congeries of very fine silky crystals of narcein. These were separated by filtration and pressure, and re-crystallised. The liquid now contained only meconin and papaverine. It was shaken several times with ether, the ether removed and distilled off, and the resinous-looking residue boiled with water, in which it partly dissolved; meconin crystallised on cooling. I could find no papaverine in this substance.

The precipitate by ammonia was boiled with rectified spirit. After cooling, the spirituous liquid, which contained the thebaia with a little narcotine, was separated from the undissolved portion, the spirit distilled off, the residue mixed with a slight excess of acetic acid, and then thrown into a large quantity of cold water. A copious deposit of resin was formed. After filtration, basic acetate of lead was added until the liquid had a faint alkaline reaction. A copious precipitate fell, containing, with oxide of lead, resin, narcotine, and papaverine. From the liquid the excess of lead was removed as sulphate by sulphuric acid; after filtration it was nearly neutralized with carbonate of soda, and then treated with solution of ammonia in slight excess. Thebaia, morphia, and resin were thrown down as a light brown precipitate. This was collected, dried, and powdered, boiled with spirit, filtered, the spirit distilled off, and the residue set aside in a capsule for some days. It became filled with crystals of thebaia and morphia. After pressing and re-crystallisation, the morphia was removed by digestion in solution of caustic soda, and the thebaia purified by solution in acetic acid, digestion with animal charcoal, precipitation with caustic soda, and repeated crystallisation out of alcohol.

The precipitate with basic acetate of lead was dried and boiled with spirit, the spirit distilled off, and the cooled residue, after separating the crystals of narcotine, mixed with dilute hydrochloric acid. After some days, the hydrochlorate of papaverine ought to have crystallized, but although a few crystals were observed at one time, when I was too busy to attend to them, they disappeared again, and could not be reproduced. I, therefore, varied the proceeding. The liquid was mixed with twice its volume of spirit, then with excess of caustic soda; ether equal in bulk to the alcohol was now added, and then with agitation water, until the ether separated, carrying with it papaverine and narcotine. The ether was evaporated, and the residue boiled with spirit; crystals of narcotine separated on cooling. The papaverine should now have been in the mother-liquor. This was evaporated, and a further crop of small crystals obtained, which were supposed to be the looked-for base. After they had been purified with a great deal of trouble, they weighed 20 grains; they were found, however, to be nothing but narcotine. I am inclined to think that the failure was owing rather to bad management in some stage of these complicated operations, than to the absence of papaverine in the opium.

The narcein obtained by me corresponded more closely with the description of this substance given by Pelletier than with that by Anderson. It is colored of a beautiful, azure blue, by moderately strong sulphuric and hydrochloric acids, as described by the former, though the latter denies the coloration. Strong sulphuric acid dissolves it to a dark brown, almost black solution. I could not obtain the red color with sulphuric acid, described by Anderson.

(To be concluded.)

Varieties.

Acclimatization in Australia.—A New Zealand Journal, speaking of the two white swans presented by the Queen to this colony, and which were placed on the North Shore Lake, says that they were sitting on no fewer

than eighteen eggs. The swans had been hatched alternately for three weeks. One of the Canadian geese which came with the swans, and from the same royal donor, flew away some time after being placed on the lake, but the remaining bird took up with the common geese, and the result has been a magnificent cross. The divers are doing well. In Victoria, measures are in progress for the speedy introduction and acclimatization of roedeer, partridges, rooks, hares, sparrows, and song birds, from England; deer, Cashmere goats, and black partridges from India; ostriches, pheasants, and partridges, and antelopes from the Cape of Good Hope; for all of which the money has been remitted by the Acclimatization Society. A letter was recently received by the Acclimatization Society of New South Wales from Mr. Black, of Miumi, inclosing a sample of wool from an Angora goat, descended from those that were imported some years ago into this colony. Mr. Black, who has paid much attention to improving the breed of goats, states that their wool and fat are exceedingly valuable; that their flesh is in no way inferior to mutton, but rather resembling venison; that the females breed twice a year, producing generally two at a birth; that they require very little shepherding, and thrive well where nothing else could be kept with profit.—*Medical Times and Gazette*, Jan. 13, 1863.

Bleaching Shellac.—DR. SAUERWEIN (*Monatsblatt d. Gewerbver. f. Hanover*, July and August, 1863—*Chem. Centrbl.* No. 6, 1863,) recommends the following process as the most advantageous:

Twenty-five parts of shellac are dissolved in 600 parts of water together with 10 of sal soda, and the solution filtered. On the other hand, 30 parts of hypochlorite of lime are rubbed up with water, and the strained liquor precipitated by a solution of sal soda, about equal weights of sal soda and hypochlorite. The chlorinated soda liquor is diluted to 600 parts, and gradually added to the shellac solution together with some dilute muriatic acid, just sufficient not to cause any precipitation, keeping the mixture stirred. It is then exposed to the direct rays of the sun for a day or two, when the bleaching is complete. The addition of muriatic acid very materially aids in the bleaching process, but requires to be done with care. When bleached, the solution is filtered, mixed first with a little sulphite of soda (anticlore,) and then with sufficient muriatic acid to precipitate the bleached lac. The latter agglutinates on warming, is removed from the liquor and washed in pure water. The superior silky lustre is produced by malaxating it at the lowest possible temperature.—*Druggists' Circular*.

Fir Wool Oil and Fir Wool.—These preparations have for a long period been held in high estimation in Germany, where they are largely manufactured by Messrs. Schmidt & Co., of Remda, on the Thuringian forest. Some time has elapsed since their first introduction into this country, a

brief notice of them having appeared in Professor Bentley's *Manual of Botany** more than two years ago; it is, however, only recently that attention has been directed to their valuable properties. They are procured from the finer leaves of the *Pinus Sylvestris*, the Scotch fir, or Cild pine, a well-known tree belonging to the family *Pinaceæ* or *Coniferæ*—The Pine, or *Coniferæ* order, that oil being obtained by distillation, and the wool prepared by some chemical process. The former, which is almost colorless, possesses a pleasant aromatic, pinic odor, and an aromatic, and to many, not unpleasant taste. Its specific gravity is .868; it is soluble to some extent in rectified spirit, but more readily so in ether, and burns with a sooty flame, like turpentine. It is stated to prove an unfailing remedy in cases of rheumatic and gouty affections, chalk-stones, paralytic, catarrhal, and spinal affections, chilblains, and burns. In a short notice of this remedy in a recent number, the *Lancet*† says, "As a remedy for rheumatism, it has long been approved of by the leading members of the German faculty, including Dr. Hopp, Professor of Medical Science in Basel; Dr. Paul Niemeyer, in Magdeburg; Dr. Henschkel, in Kaltennordheim; Dr. Pauly, in Fost; and Dr. Bajakowsky, in Rosenburg." It is largely prescribed in Germany at the present time, and the increasing demand for it in this country seems to promise its acquisition of a high reputation as a remedial agent.

The wadding is employed for bandaging, and is the best medium for applying the oil; it is said to be repulsive to vermin, and is employed for lining dresses, &c. A knitting yarn is also prepared from the pine leaf, which, in conjunction with other fibrous substances, is woven into articles of clothing, which are stated to render those who wear them free from rheumatic attacks. In cases of rheumatism, gout, neuralgia, and catarrhal affections, as cough, hoarseness, sore throat, and cold in the head, the suffering parts are to be moistened with from fifteen to twenty drops of the oil, and then to be covered tightly with the wadding, so as to exclude the air. A few minutes after the application, a prickling sensation or warmth should be experienced, which is a symptom that the remedy is taking effect. Should this not ensue, the application is to be repeated, and if no irritation be produced within fifteen minutes, moisten the wadding with the oil, when the desired effect will be produced. Should the prickling become painful, remove the wadding and the irritation will abate; in no case must the irritation be allowed to become too painful; and when applied to children, or where the skin is tender, it should be mixed with an equal proportion of olive oil. In cases of chronic rheumatism and gout, its internal administration in doses of from fifteen to twenty drops twice a-day, has been found beneficial. In catarrhal affections, the inhalation of the vapor from ten drops of the oil poured into hot water, and the use of a warm foot-bath containing about thirty drops of the oil, will be found beneficial

* Page 659.

† January 31, 1863, p. 138.

Rheumatic pains in the back or limbs, occasioned by cold, are stated to be removed by the use of a warm bath, into which about forty drops of the oil have been put.

Rheumatic toothache may be immediately relieved by rubbing the gum with the oil, and if there be a decayed hollow tooth, by putting a little of the wadding steeped in the oil, into the cavity. Rheumatic face ache, by moistening first the gums and then the cheek, with a few drops of the oil, and covering it with the wadding; and rheumatic earache, by putting a few drops of the oil mixed with almond or olive oil upon a piece of the wadding, and introducing it into the ear. After a cure has been effected, it is recommended to continue the application of the remedy twice or thrice a-week, to prevent a return of the complaint.—*London Chemist and Druggist.*

Compressed Red Precipitate.—We have had forwarded to us from a subscriber at Taunton a specimen of red precipitate condensed into a solid form, so as to admit of being employed in the same manner as a pencil of lunar caustic.

The use of red precipitate as an escharotic has been frequently found inconvenient, owing to its having to be employed in the form of powder, which cannot be applied exactly where required. This source of annoyance is completely obviated by the formation of the remedy into a solid stick, which we should think would be found very useful in all cases where the employment of red precipitate is indicated.—*Chemist and Druggist.*

Water-Proof Walks.—But a new method of path-making is fast coming into vogue, and will soon be universally adopted for its cheapness, general excellence, and permanence; in fact, when once well done it lasts forever. Instead of making the walk of loose material, on the old fashion, concreting is resorted to, by which the appearance of gravel is retained with all its freshness and beauty of contrast to grass and flowers, and the walk itself is rendered as dry and durable as the best pavement. The *modus operandi* is as follows:—Procure a sufficient quantity of the best Portland cement, then with the help of a laborer turn up the path with a pick, and have all the old gravel screened, so as to separate the loam and surface weeds from it, and to every six parts of the gravel add three parts of gritty sand of any kind—but soft pit sand is unsuitable—and one part by measure of Portland cement. When these are well mixed together in a dry state, add sufficient water to make the whole into a moderately stiff working consistence, and lay it down quickly two inches thick on a hard bottom. A common spade is the best tool with which to spread it; it must be at once spread as it is to remain forever, and a slight convexity

given to the surface. In 48 hours it becomes as hard as a rock; not a drop of rain will go through it, and if a drop lodges on it, blame yourself for not having made the surface even; but a moderate fall is sufficient with such an impenetrable material. Not a weed will ever grow on a path so formed; not a worm will ever work through it; a birch broom will keep the surface clean and bright, and of course it never requires rolling. It is necessary to be very particular as to the quality of the cement, for a great deal of rubbish is sold under the name of real Portland. For the flooring of a green house, fowl-house, potting-shed or barn, this is the best and cheapest that can be had—always clean, hard, and dry, and never requiring repairing of any kind if carefully put down in the first instance.

—*Journal Franklin Institute.*

Propylamin in Tic Doloureux.—Mrs. S., aged 56 years was attacked in December last, with the form of neuralgia commonly known as "*tic doloureux*." She had, before this, been a hard laboring, but not a strong woman. The pain was very severe, amounting to paroxysms of the hardest kind, and did not yield to the common remedies. The usual chalybeates, vegetable tonics, anodynes and narcotics were administered, and subcutaneous injection was also resorted to. The stomach at last became irritable, and rejected both medicines and nourishment.

Narcotics and anodynes were then applied locally, and chloroform was administered largely, especially during the paroxysms. Blisters were next resorted to, and solutions of atropine and morphine were freely used on the blistered surface.

The pain gradually diminished, and the paroxysms became less frequent. Soon the patient began to recover her appetite, and the strength began to increase, so that on the first of the present month she was about the house, but not able to perform much labor.

About the 13th inst. she had another attack nearly like the first, but the pain was felt over a larger surface. It now extended along the side of the nose, back of the neck, through the shoulders and the length of the *left* arm. Much of the time, and especially during the paroxysms, she shrieked with pain. The remedies before used were resorted to, but without much effect.

Having heard of the *propylamin*, as prepared by J. R. Nichols & Co., being useful in cases of rheumatism and some nervous diseases, its use was suggested in this case, on the 15th inst., the patient at that time being no better. Twenty-five drops of propylamin were prepared with six ounces of water, and one tablespoonful was given to the patient once every two hours. After taking eight doses of the medicine, the pain had entirely left her. The blister had, during the same time, been occasionally dressed with the solution of morphia. The use of the propylamin was continued until March 18th, when she vomited a large quantity of a greenish-yellow fluid, and complained of great faintness and a sinking sen-

sation at the pit of the stomach accompanied by an intolerable *thirst*. The pain has not since returned, but a severe soreness remains wherever the pain has been; the use of the propylamin was discontinued.

March 20th.—The patient has no pain, but complains of a prickling, itching sensation in the shoulder joints, along the spine, in the knees, ankles and heels. The pain has not returned since before the vomiting began.

Not having had much experience in the use of propylamin, and never having known of its use in a case like this before, I should be glad to learn from those members of the profession who are better acquainted with its use, their experience, and also their opinion of its therapeutic action.

What would be the symptoms of an overdose?

Were the vomiting, faintness and intolerable thirst produced by it?

Were the prickling and itching sensations, two days after, produced by the same cause?

I have great confidence that the propylamin was the chief cause of relieving the pain in the present instance; but the question arises whether these peculiar symptoms were produced by the medicine or not, as I know of no other cause for them.

What would be the antidote for an overdose of propylamin?

Barnet, Vt., March 21st, 1863.

BENJ. F. EATON, M. D.

Boston Med. and Surg. Journ.

Copaiba and Storax as Specifics in Croup and Diphtheritis, by M. Tridau.—In the midst of a very fatal epidemic of diphtheritis, which had caused the death of two or three hundred persons in the Canton of Chaillet, district of Laval, (Mayenne,) the idea occurred to me of employing a medicine acting powerfully on the mucous membrane, which would influence its vitality, and I made choice of copaiba and storax. From the first period of their employment, about five months and a half, I have cured five cases of croup and forty cases of diphtheritic angina. I have not lost but a single patient. In about twenty-four hours the amelioration commences, and a cure is effected in from four to six days.

I employ the copaiba either as a syrup, (one part to sixteen,) or in the solidified state. The storax is also employed as a syrup. For adults, I prescribe a table spoonful every two hours. For children, of 4 to 6 years, a teaspoonful taken in the same way. In serious cases an injection containing five grammes (seventy-seven grains) of copaiba is given twice a day.—*Rep. de Pharm. Mars*, 1863.

NOTICE.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The Tenth Annual Meeting of the American Pharmaceutical Association will be held in the city of Baltimore, Maryland, on Tuesday, the 8th day of September, 1863, at three o'clock, P. M.

After taking counsel with prominent members of the Association in various parts of the country, and duly weighing an invitation to meet at Pittsburgh, it was determined to accept the prior official invitation of the Maryland College of Pharmacy. A meeting in Baltimore, it was thought, would be better attended at the present time than in any western location. In view of this decision, the members generally are earnestly invited to keep in memory the various interests of the Association, that should be developed at the Annual Meeting; the several standing committees are encouraged to early prepare their reports, and those members who accepted subjects for investigation at the Philadelphia meeting last year, are particularly invited to have their papers ready, and, in the event of not attending the meeting, to forward them to the President of the Association, care of Andrews & Thompson, Pharmacists, Baltimore.

The objects of the Association are fully explained in Article 1st of the Constitution; the conditions of membership are in Article 2d. "Every pharmacist or druggist of good moral character and professional standing, whether in business on his own account, retired from business, or employed by another, who, after duly considering the objects of the Association, and the obligations of its Constitution, is willing to subscribe to them, is eligible to membership." Pharmacists and druggists desirous of membership, may obtain further information, and a copy of the Constitution, by applying to the Chairman of the Executive Committee, Edward Parrish, 800 Arch St., Philadelphia. All applications for membership should, when possible, be in the hands of the Executive Committee at the opening of the first session.

WILLIAM PROCTER, Jr., *President.*

Philadelphia, April 20th, 1863.

Abstract of the Minutes of the Philadelphia College of Pharmacy.

At the Forty-second Annual Meeting of the College held at their Hall, Third month 30th, 1863. The President in the Chair.

The Minutes of the Board of Trustees for the last six months were read, they inform that George Ashmead has been elected a Resident Member of the College, and that at the Annual Commencement, held on the 12th inst., the following Students of the School of Pharmacy, received the degree of Graduate in Pharmacy.

GRADUATING CLASS.

SUBJECT OF THESIS.

Adolphus Bachman.....	<i>The Apothecary's Position.</i>
Christian Berger.....	<i>Helleborus Niger.</i>
Franklin Coggins.....	<i>Cucurbita Pepo.</i>
George W. Eldridge.....	<i>Oxycoleus Macrocarpa.</i>
Daniel S. Fox.....	<i>Podophyllum Peltatum.</i>
George M. Hambright.....	<i>Cortex Radicis Myricæ Ceriferae.</i>
C. Ferdinand Hoffman.....	<i>Morus Alba.</i>
James Kenworthy.....	<i>Krameria, Geranium, &c.</i>
Joseph C. Kirkbride.....	<i>Chimaphila Umbellata.</i>
Paul Frederick Lehlbach.....	<i>Alcoholic Fermentation.</i>
William McIntyre.....	<i>Leonorus Cardiaca.</i>
Alfred Mellor.....	<i>Aesculus Hippocastanum.</i>
Elijah S. Morell.....	<i>Pittosporum Tobira.</i>
Talbot C. Murray.....	<i>Commercial Lactucarium.</i>
Earl Penn Rohrer.....	<i>Chlorate of Potassa.</i>
James Ruan.....	<i>Cucurbita Peponis Semines.</i>
Edwin R. Smith.....	<i>Medicinal Compounds of Iron with Albumen.</i>
Jason P. Thomas.....	<i>Agathotes Chirayta.</i>
F. A. Tilge.....	<i>Symplocarpus Fatsidus.</i>
Edwin Tomlinson.....	<i>Eupatorium Perfoliatum.</i>
John B. Trednick.....	<i>Euonymus Atropurpureus.</i>
Henry J. Weber.....	<i>Sabbatia angularis.</i>

A Report was received from the Publication Committee, showing that the American Journal of Pharmacy has been regularly issued without reducing its size, though the diminished receipts of the Committee have not been adequate to meet the increasing expenses of publication consequent, in part, on the great advance in the price of paper. In view of the importance of maintaining the Journal unimpaired, on motion, the Com-

mittee was authorized to draw on the funds of the College to meet the deficit in its funds.

The Committee on Labels made a Report, showing a cash balance in their hands, a portion of which was, on motion, appropriated to the Committee on Sinking Fund.

The Committee appointed at the Semi-Annual Meeting to confer with the Commissioner of Internal Revenue, having no Report to make, the subject is continued in their charge.

The Annual Election was then ordered. Wm. C. Bakes and Wm. Evans, Jr., acting as tellers. After a recess they reported the following Officers and Committees as being duly elected :

<i>President,</i>	Charles Ellis.
<i>1st Vice-President,</i>	Samuel F. Troth.
<i>2d Vice-President,</i>	Dillwyn Parrish.
<i>Treasurer,</i>	Ambrose Smith.
<i>Recording Secretary,</i>	Edward Parrish.
<i>Corresponding Secretary,</i>	Wm. Procter, Jr.

Trustees.

Dr. Robert Bridges,	Daniel S. Jones,
Jno. M. Maisch,	T. Morris Perot,
T. S. Wiegand,	S. S. Bunting,
Saml. N. James,	Jas. T. Shinn.

Publishing Committee.

Charles Ellis,	E. Parrish,
Wm. Procter, Jr.,	A. B. Taylor,
	J. M. Maisch.

Committee on Sinking Fund.

S. F. Troth,	Ambrose Smith,	E. Parrish.
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Delegates to the American Pharmaceutical Association.

Edward Parrish,	Jas. T. Shinn,
Geo. J. Scattergood,	Wm. C. Bakes,
	Wm. Evans, Jr.

The meeting then adjourned.

EDWARD PARRISH, *Secretary.*

Editorial Department.

THE PHARMACOPEIA OF 1860.—We have pleasure in stating that the stereotyping of this work is progressing rapidly, about 320 pages having passed the committee. Those unacquainted with the extreme care which is required to avoid errors or blunders, can hardly appreciate the amount of trouble which it has cost the Committee, and especially the editor, Dr. Bache, so that not only shall no errors of sense be admitted, but that in language every part shall be consistent with the rest. Should no unforeseen delay occur, it is probable that the work will be ready before our next issue. The price will be at the much reduced rate of one dollar per copy, and it is greatly to be desired that every apothecary in the country, who has any regard for his profession, will obtain a copy, and use it as his guide-book for preparations. The process of percolation has been introduced most thoroughly, and the manipulation requisite to its conduction so carefully described as to leave no excuse for failure.

THE MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.—At page 279, our readers will observe the official announcement that the next meeting of the Association is to be held in Baltimore on the 8th of September next. Many would have preferred a more western locality, as Pittsburgh, Cincinnati, Buffalo, Cleveland, Detroit or Chicago; but it was strongly doubted whether the interest felt in the Association in those cities would have justified going there without a spontaneous invitation. Pittsburgh showed a warm hand, but the Maryland College of Pharmacy early expressed officially their wish to have the meeting in Baltimore. Besides the numerous apothecaries of that city, who form a respectable nucleus, its proximity to Philadelphia, Washington, New York, etc. give chances of support that favor the idea of a fair gathering. Add to these the number of members who generally attend the meetings, and we have grounds for the belief that the choice was the best, that, under the circumstances, could have been made. But whilst these probable causes of success operate, let the active members put their shoulders to the wheel, and urge on the movement by making a little sacrifice of time, to prepare their papers, and of money, to attend the meeting, and in this way keep the fire of professional zeal burning brightly, until our national troubles shall have subsided and left us free to pursue the objects of the Association untrammeled by the many adverse influences which arise from the present state of war.

THE UNITED STATES ARMY LABORATORY.—The actual history of the medical supplies to the U. S. Army during the present rebellion, will furnish an interesting chapter in the history of the war should it ever be faithfully written. From the time when the first general battle in Virginia enlisted the sympathies of all in providing hospital supplies, to the period when the present almost luxurious outfits of the surgical department commenced, various changes and improvements have been made, and if we may credit the half that is told, the most glaring want of economy in the management of the supplies has occurred. The fitting out of hospital supply wagons with drawers and bottles as complete as in a family medicine chest, was a great advance, and doubtless has aided materially in giving that prompt relief to the wounded and sick which greatly reduces the fatality of military surgery and hospital treatment. Perhaps no one has had more to do in giving a practical character to these improvements than Dr. Edward R. Squibb, late of the U. S. Naval Laboratory. Since the accession of Dr. Hammond to the Surgeon Generalship, however, the idea of establishing laboratories entirely under the control of the Medical Bureau of the army has been suggested, and three such have been commenced, one at New York, one at St. Louis and the other in Philadelphia; each being under the direction of a Surgeon of the army, who of course has to employ a competent pharmaceutical chemist to conduct the laboratory. Dr. A. K. Smith, has control of the Philadelphia establishment, and has appointed our friend Prof. Maisch, late of Dr. Squibb's laboratory, to superintend the laboratory, which is being located at 6th and Oxford streets, where he expects to conduct the various chemical and pharmaceutical processes, including pulverization of drugs, and putting up in suitable packages these and other supplies for the army. Should the war continue, this arrangement may be conducive to economy, if its management falls into able and conscientious hands; yet it may well be doubted whether the result will prove its wisdom as to economy in expenditure. If the same liberal course is pursued that formerly appertained to the Naval Laboratory, these establishments may have a useful influence in controlling the quality of drugs by exposing imposition, whether the result of ignorance or rascality.

MEDICAL DEPARTMENT OF THE UNIVERSITY OF PENNSYLVANIA: VACANT PROFESSORSHIPS.—The termination of the late session of this venerable Institution was marked by the resignation of two of its oldest and most esteemed Professors, who retire from their labors after a long service in the cause of medical instruction—Prof. Samuel Jackson and Prof. Hugh L. Hodge. Prof. Jackson commenced his professorial career in the Philadelphia College of Pharmacy at its primary course 1821-22, with the branch of *materia medica*. He resigned from the College, however, some years before his accession to the Chair of Physiology in the University which he has filled with success for nearly thirty years. The vacancies thus occasioned are to be supplied during the present month.

NEW YORK COLLEGE OF PHARMACY.—At an adjourned meeting of that College, held on Thursday 26th last, the following officers were elected to serve during the ensuing year :

H. T. Kiersted, *President*. John Milbau, 1st *Vice-President*. John Meakim, 2d *Vice-President*. Isaac Coddington, 3d *Vice-President*. Thomas T. Green, *Treasurer*. P. W. Bedford, *Secretary*. J. Carle, Jr., W. Neergaard, J. W. Shedd, G. W. Southwick, J. H. Westerfield, G. C. Close, G. D. Coggeshall, A. W. Gabaudan, W. Wright, Jr., *Trustees*. J. Meakim, G. C. Close, W. Neergaard, F. F. Mayer, P. W. Bedford, *Delegates to the American Pharmaceutical Association*.

COMMENCEMENT OF THE NEW YORK COLLEGE OF PHARMACY.—As announced in our last issue the thirty-third Annual Commencement of this institution took place on the nineteenth of March, at the chapel of the New York University, before a large and fashionable audience.

The exercises consisted in an opening prayer by Rev. Isaac Ferris, D. D. LL. D., Chancellor of the University, and an address by the venerable President, Henry T. Kiersted, Esq., at the close of which he conferred the degree of Graduate in Pharmacy on

Gustavus Krehbiel, of New York City.

Ernest V. Troiley Le Lievre, of Santa Isabel, Cuba.

Charles B. Smith, of Newark, N. J.

Theobald Frohwein, of New York City.

James S. Higgins, of New York City.

The Valedictory Address to the Graduates was delivered by Prof. John M. Maisch.

The proceedings were enlivened with some excellent music discoursed by Dodworth's orchestra.—*Druggists' Circular*.

MASSACHUSETTS COLLEGE OF PHARMACY.—At the annual meeting of the Massachusetts College of Pharmacy the following members were chosen officers for the ensuing year :

Thomas Hollis, *President*. Chas. A. Tufts, Samuel M. Colcord, *Vice-Presidents*. Henry W. Lincoln, *Record. Secretary*. James S. Melvin, *Corresp. Secretary*. Ashiel Boyden, *Treasurer*. Joseph T. Brewer, *Auditor*. Daniel Henchman, Isaac T. Campbell, A. P. Melzar, Elijah Smalley, John Buck, Albert G. Wilbor, Robert R. Kent, Geo. D. Ricker, *Trustees*.

ST. LOUIS PHARMACEUTICAL ASSOCIATION.—At a Monthly Meeting in March, of the St. Louis Pharmaceutical Association, the following Officers were elected for 1863.

President, Theodore Kalb. 1st *Vice-President*, James W. Francis. 2d *Vice-President*, Edwin R. Swann. *Recording Secretary*, James McBride. *Corresponding Secretary*, Eugene L. Massot. *Treasurer*, Thomas Scott. *Executive Committee*, Enno Sander, Thomas Tanton, Joseph McCullough,

James McBride, Arthur P. Hollister. *Committee on the Progress of Pharmacy*, Alexander Leitch, Thomas Scott, Edwin R. Swann, Hubert Primm, Eugene L. Massot.

There were very few in attendance at the meeting, and it appears that all interest in the Association, or in the advancement of Pharmacy in St. Louis, has gone. Yours truly,

E. L. Massot, *Corresponding Secretary.*

COMMENCEMENT OF THE PHILADELPHIA COLLEGE OF PHARMACY.—The Annual Commencement of the Philadelphia College of Pharmacy was held at the Musical Fund Hall, on the evening of Thursday the 12th of March, on which occasion the President conferred the degree of Graduate in Pharmacy on twenty-two students of the School of Pharmacy. The Valedictory Address, delivered by Prof. Robert P. Thomas, was listened to with marked attention by a large audience.

Just before the ceremony commenced, and whilst the Professors, the Trustees and their invited friends were in the room below the Hall, Geo. M. Hambright, on behalf of the Graduating Class of 1863, presented to the College a portrait of Prof. George B. Wood, late of the University, and one of the eldest living ex-professors of our School of Pharmacy. Prof. Bridges, as Chairman of the Board of Trustees, accepted the gift. The speaking on the occasion, though brief, was very appropriate, and the picture highly creditable to the artist as a excellent likness.

Chemistry. By William Thomas Brande, D. C. L., F.R.S.L. and E., etc. and Alfred Swaine Taylor, M. D., F.R.S., etc. Prof. of Chemistry and Medical Jurisprudence in Guy's Hospital. Blanchard and Lea, Philada., 1863. pp. 690. Octavo.

This work is a reprint of the English edition, without comment, but its passage through the press was superintended by a competent chemist. The authors appear to have aimed at producing a book specially adapted to the student who is desirous, with as little impediment from technicalities as comports with a clear development of the science, of getting an insight into its principles and laws, as well as of the appearance and properties of chemical substances.

In the struggle after a key to the natural arrangement of chemical bodies, so many theories have been advanced, so many systems of classification and nomenclature been suggested, and so much that, as yet, is merely hypothetical, has been introduced to fill up the gaps, that the student is in danger of mistaking the scaffolding for the building. In truth, the recorded observations are so numerous, and so many evidently important facts and discoveries stand isolated from the general arrangement, that until some master hand arises capable of systematizing these more effectually than has yet been done, the student will find works like Fownes and Turner to be more profitable than those of Gmelin or Liebig. The authors re-

mark, "With ample material at our disposal to produce two volumes in place of one, we have studiously endeavored to compress within these pages a selection of the more important facts and doctrines of modern chemistry. We have adopted for the explanation of these facts, that simple chemical language which has found acceptance in the schools and colleges of Great Britain, France and Germany, as well as in the best treatises on the science."

"In addition to the general properties of bodies, we have attached to the description of each substance, a summary of its most important characters, with an account of the special tests required for its detection. The student will thus have in this book a *manual of practical Chemistry*. As an adjunct to this branch of the science the subject of *practical Toxicology* has been introduced in reference to the most important poisons, and the process for their detection."

How far the authors have succeeded in attaining their object we cannot decide without more time for examination, but so far as we have looked through the inorganic portion of the work, we have been favorably impressed with its simplicity and clearness. Taking oxygen, for example, we have a succinct historical notice, a full account of its preparation by several processes, its properties, the nature of oxidation, the constitution of the oxacids, reduction, decay, eremacausis, putrefaction, the chemical tests, combustion, ignition, the nature of flame, and finally, ozone and antozone, and their compounds, embraced in twenty-six pages. This fulness is noticed in regard to water, charcoal, ammonia, etc., the remarks having a view to the practical importance of the subjects. Under the head of silver, the subject of photography is very clearly developed in regard to Daquerreotyping and the collodion process on glass and on paper.

In the organic department no scientific arrangement has been attempted. Substances are grouped in the simplest manner: as the starchy group, lignin and products, essential and fixed oils, organic acids and alkalies, coloring principles, etc. The authors evidently have not devoted as much labor to this department as to the inorganic; yet by a judicious selection of language, they have managed to make the individual subjects clear, and in many cases full. One striking peculiarity of the book is the absence of wood cuts. The authors, in a prefatory note, speak rather disparagingly of this mode of illustration, and refer their readers to catalogues of chemical apparatus, but we beg leave to differ from them in regard to the value of these figures as aids to the student, believing that many processes are much more easily understood by the help of diagrams. In conclusion, we believe this volume has strong claims to the consideration of chemical teachers in our medical and pharmaceutical schools, for whose use the authors are well qualified to adapt it by their long experience as teachers.

The Druggists' Receipt Book: comprising a copious veterinary formulary; numerous recipes in patent and proprietary medicines, druggists' nostrums,

etc. ; perfumery and cosmetics, beverages, dietetic articles and condiments, trade chemicals, scientific processes, and an appendix of useful tables. By Henry Beasley. Fourth American, from the fifth London edition. Philada: Lindsay and Blakiston, 1863.

The Druggist's Receipt Book embraces many recipes useful to the apothecary, and should have a place on his book shelf for shop use.

The Sunbeam and the Spectrascope. By Howard Townsend, M. D., Prof. of Materia Medica, Albany Medical College. Read before the Albany Institute, Feb. 17th, 1863. pp. 15.

We have rarely met with an essay more to the point, less clogged with unnecessary words, or giving a clearer view of the subject of which it treats, —the nature of light and the wonderful developments of the Spectrascope. We cannot do better than give an example :

" Lavoisier has very beautifully said—

'The fable of Prometheus is but the overshadowing of a philosophic truth: Where there is light *there* is organization and life; but where light cannot penetrate *there* death forever holds his silent court.'

If a sunbeam be allowed to enter a darkened room, it falls on the floor and forms a disc of bright light. This is radiated to the eye which conveys the impression to the brain, and the phenomenon of vision is established.

Should the hand be placed in the track of the sunbeam, the sensation of warmth is communicated, and we feel there is heat in the rays.

If a piece of paper covered over with chloride of silver, which is purely white, be placed so that the sunbeam falls upon it, a darkened track will be immediately produced over the space the sun's ray has passed; it has liberated the chlorine, leaving the metallic silver.

Such remarkable phenomena teach us that we have to deal with agencies in the solar rays, which are in their visible effects very dissimilar.

Actinism, which means *ray power*, is now the term adopted to express the chemical principle of the sunbeam.

That these three functions of the sunbeam—light, heat and actinism—all differ from one another, may be thus proven.

A piece of black mica will allow no *light* to pass through it, but offers no obstruction to *solar heat*.

A plate of glass, stained apple green with oxide of copper, is perfectly transparent to light, but opaque or impermeable to heat.

Glass which has been stained yellow with oxide or chloride of silver allows a flood of light to pass through it, but permits no permeation of an *Actinic ray*.

And on the contrary, if we use a glass colored deeply blue, with the oxide of cobalt, though but very little light can pass through it, experiment proves that it offers no obstruction to the chemical rays; that is, it permits the permeation of the *Actinic ray*.

This fact of yellow glass interfering with and intercepting the actinism of the sunbeam, has lately been taken advantage of in photography. The photographer no longer shuts himself and his prepared plate in a dark dungeon, for now the old dark chamber, *camera obscura*, is beautifully illuminated by the sun's rays passing through yellow glass, which effectually excludes the actinic, the chemical rays which alone the photographer dreads in this part of his process, but which allows all illuminating rays to be transmitted.

The strength of evidence appears to be in favor of considering light,

heat and actinism as three distinct principles or powers, active in regulating the great phenomena of nature. These agents are unceasingly at work. It is impossible to expose any body, however solid and persistent it may appear, to the influence of sunshine, without its undergoing a molecular or chemical change. In darkness, all bodies appear to possess the power of restoring themselves to their normal state. Should the sun shine uninterruptedly upon a granite monolith or a bronze statue, it would perish independently of any other destructive influences.

Night seems as necessary to secure the permanence of the inorganic world as darkness and sleep are essential to maintain in healthful life the organized creations."

Canada Lancet. Edited by Wm. E. Bowman, M. D., Montreal, C. E.

This is the title of a monthly periodical which commenced its existence, March 14th, 1863. Each number contains eight pages.

OBITUARY.

WAEDER MORRIS, one of the original members of the Philadelphia College of Pharmacy, died on the 10th of March, 1863, in the seventy-fourth year of his age. Mr. Morris' parents were Philadelphians, but removed to Pottsgrove, Pa., where he was born Oct. 3d, 1789. At an early age he entered the service of a druggist named Elliot, in Front street, and, when twenty years old, he commenced business on his own account at 45 north 3d street, where he continued the business personally for forty-four years, he retiring in 1853. Warder Morris took an active part in the establishment of the College, and, until a few years back, continued his interest in its proceedings. His mind possessed strongly marked peculiarities. In deliberations with his fellow-members, he gave his opinion freely, without fear or favor, and was sometimes a little caustic; nevertheless his really kind nature dispelled any bitterness, and always retained for him the respect of his associates.

PROF. LEHMAN, of the University of Jena, the renowned Physiological chemist, died on the 6th of January, whilst yet in the prime of life. He had been connected with the University eight or nine years, and was much esteemed as a lecturer and practical instructor. Prof. Lehman is well-known in this country as the author of the *Physiological Chemistry*, published by the Cavendish Society.

ERRATA.

Vol. xi. Page 20, 4th line from below: place *as a qualitative reagent* after "Planta-Reichenau."

Page 21, 13th line from above, read: "1-30.000 of an equivalent of Conia."

Page 23, 1st line from top, read: 60 instead of "100."

Page 23, 12th line from below, read: 10 instead of "40."

Also, vol. x., p. 388, 3d line from top, put *solution* for "sulphate," and *boiled* for "boiling."